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ADMINISTRATION REPORT

OF THE

DIRECTOR OF AGRICULTURE

FOR THE YEAR

1932.

GEORGETOWN, DEMERARA:
PRINTERS TO THE GOVERNMENT OF BRITISH GUIANA
"THE ARGOSY" COMPANY, LIMITED.
1933.

DEPARTMENT OF AGRICULTURE.

Head Office.

Director of Agriculture	...Prof. the Hon. J. Sydney Dash, B.S.A. (McGill).
Deputy Director of Agriculture ...	...F. Burnett, M.C., M.A. (Oxon.).

District Agricultural Superintendents.

East Demerara	...E. M. Peterkin.
North West District	...E. Beckett, F.L.S.
Essequibo	...A. deK. Frampton, C.D.A.
West Demerara	...J. D. Gillespie, B.Sc. (Edin.).
Berbice	...H. Macluskie, U.D.A. (Aberdeen).
Essequibo (Assistant Agricultural Superintendent)	...A. A. Abraham.
Demerara (Assistant Agricultural Superintendent)	...H. D. Huggins, M.Sc. (Cornell), Dip. Agr. (I.C.T.A.).

Research—(Laboratories).

Entomologist (Seconded, Moth Borer Investigation)	...L. D. Cleare, F.L.S., F.E.S.
Supernumerary Entomologist... ...	...F. A. Squire, B.Sc. (S.A.).
Botanist and Mycologist	...E. B. Martyn, B.A. (Oxon. et Cantab.).
Chemist-Ecologist	...R. R Follett-Smith, B.Sc. (Lond.), A.R.C.S.
Assistant Chemist	...C. L. C. Bourne.

Research—(Field Experiment Stations).

Livestock Farm, Georgetown—(Veterinary Surgeon)	...T. Bone, O.B.E, M.R.C.V.S.
Experiment Station (Sugar), Sophia—(Cane Agronomist)	...C. H. B. Williams, A.I.C.T.A., Dip. Agr.
Experiment Station (Rice), Georgetown—(Plant Breeder)	...L. E. W. Codd, M.Sc. (S.A.).
Experiment Station, Cecilia, E.C., Demerara	...E. M. Peterkin.
Experiment Station, Hosororo, N.W.D. ...	...E. Beckett, F.L.S.
Experiment Station, Henrietta, Essequibo. Bush Lot Land Settlement Scheme ...	...A. deK. Frampton, C.D.A.

Botanic Gardens.

Superintendent in Charge	...E. B. Martyn, B.A. (Oxon. et Cantab.).
Horticultural Assistant	...H. A. Cole.

Agricultural Instructors.

Resident Instructor, Berbice	...E. M. Morgan.
Resident Instructor, East Demerara ...	...C. C. Dowding, F.L.S., F.R.H.S.
Resident Instructor, East Demerara ...	...D. D. Haynes.
Resident Instructor, Essequibo Islands ...	...A. W. Sears.

Agricultural Assistants.

Experiment Station, Georgetown ...	...J. Indrobeharry.
Experiment Station, Berbice	...H. B. France.

Laboratory Assistants.

Meteorological Observer	...D. D. Blackman.
Entomological Assistant	...C. Williams.
Botanical and Mycological Assistant ...	...N. Persaud.

Rice Grading Staff.

Grading Inspector	...E. G. A. Benson, B.Sc. (Lond.), Dip. Agr. (Wye), A.I.C.T.A.
Senior Examiner	...W. A. Bovell.

Clerical Staff.

Senior Clerk, Head Office	...J. F. Irving, M.C.
3rd Class Clerk (Co-operative Banks) ...	...W. G. Delph.
Accountant	...A. A. Thorne, Jr.
6th Class Clerk	...Miss O. Bardon.
Clerical Assistants	...Miss D. M. Terrill, Miss M. Cheong, Miss V. Chan-Choong.
Clerk, Botanical Gardens	...G. L. Leitch.

Sugar Experiment Stations.

Agronomist	...C. H. B. Williams, A.I.C.T.A., Dip. Agr.
Field Manager	...C. Cameron.
Laboratory Assistant	...L. A. Robinson.
Field Assistant	...L. A. Forte (seconded).
Field Assistant	...B. A. McArthur.
Clerical Assistant...	...J. B. Bourne.

In collaboration with the Officers of the Department of Agriculture.

C.S.O. No. 3037/33.

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No. 16,071.

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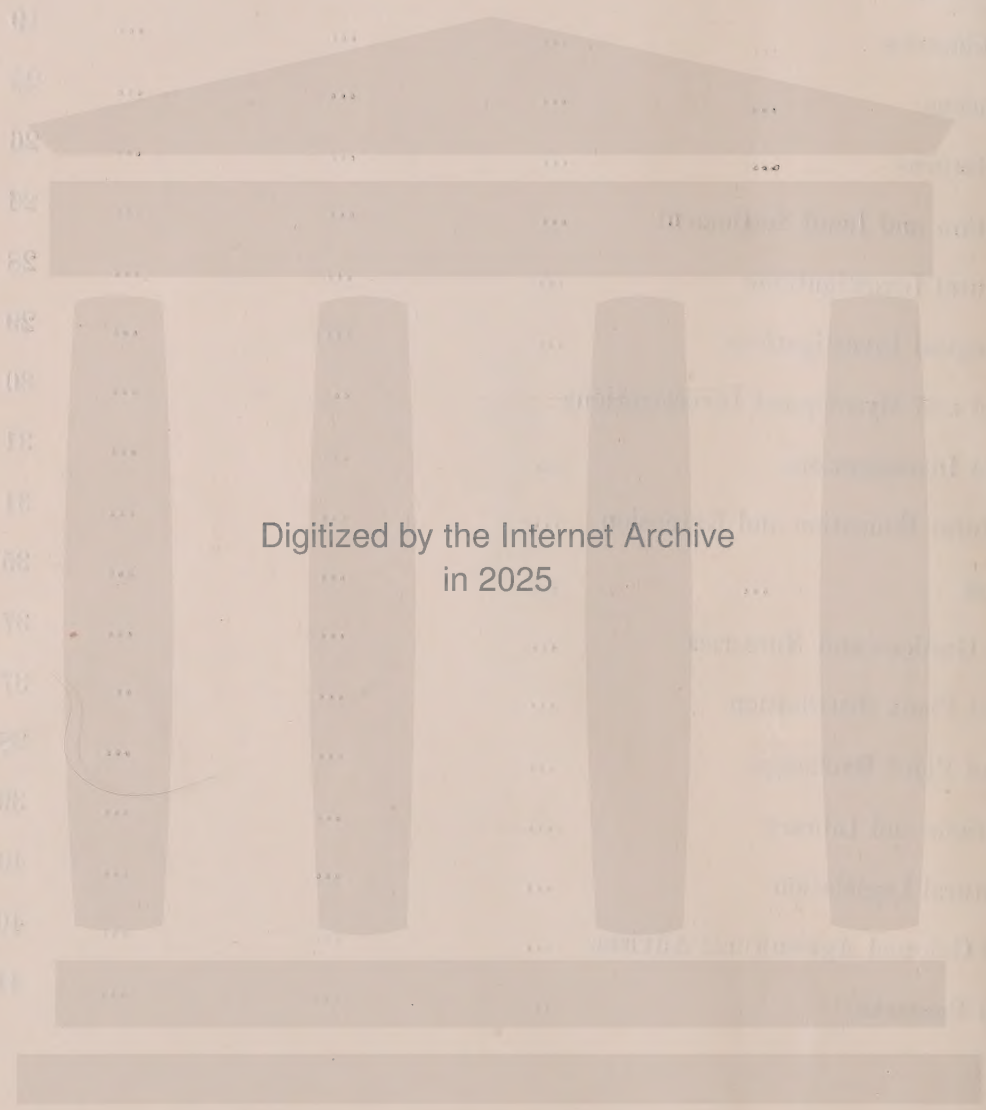

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REPORT OF THE DEPARTMENT OF AGRICULTURE FOR THE YEAR 1932.

I have the honour to submit my report on the work of this Department for the year 1932. In accordance with the policy adopted last year the reports of the Divisional Officers will be published separately.

STAFF.

2. Mr. R. R. Follett-Smith, B.Sc., A.R.C.S., Chemist-Ecologist, was granted four months' leave of absence from April 16 to September 27, 1932.

Mr. C. L. C. Bourne, Assistant Chemist, left the Colony for Barbados on January 12 on three weeks' sick leave returning on February 8.

Mr. J. A. V. Bourne, Accountant, was transferred to the Income Tax Office and Mr. A. A. Thorne, Jnr., who had acted as Accountant during the leave of absence of Mr. Bourne in 1931, was transferred from the Treasury Department and appointed Accountant as from January 1, 1932.

Mr. F. Burnett, M.C., M.A. (Oxon.), Deputy Director of Agriculture, was seconded to carry out a joint survey with the Commissioner of Lands and Mines of lands suitable for Colonisation and Land Settlement purposes on April 23, 1932. After the completion of the survey, Mr. Burnett whose leave had been postponed for this purpose, was granted four months' leave of absence from September 6, 1932.

During the absence of Mr. Burnett, Mr. E. M. Peterkin, Agricultural Superintendent, East Demerara, was appointed to act as Deputy Director of Agriculture.

Miss M. Smith, Clerical Assistant, resigned her post on August 31, 1932.

Miss V. Chan-Choong was appointed Clerical Assistant *vice* Miss Smith as from August 22, 1932.

Mr. A. deK. Frampton, C.D.A., Agricultural Superintendent, Essequibo, was granted four and a half months' leave of absence and left the Colony for England on December 3, 1932.

Major T. Bone, O.B.E., M.R.C.V.S., Government Veterinary Surgeon, was granted six months' leave of absence from January 21, returning to the Colony on September 4, 1932.

On his return to the Colony, Major Bone was detailed to carry out an investigational tour of the Rupununi District from October 1 to December 16, in connection with an outbreak of cattle disease.

Mr. H. D. Huggins, Dip. Agr. (I.C.T.A.), Assistant Agricultural Superintendent, left the Colony on September 10, 1932, to undertake a course of study on co-operative marketing at Cornell University. To enable him to secure the necessary leave Legislative Council agreed to place his post on the Fixed Establishment.

Mr. A. W. Sears, Rice Grading Inspector, was appointed to the post of Agricultural Instructor, Wakenaam, on April 13, 1932, *vice* Mr. J. E. Wilson, deceased.

Consequent on the appointment of Mr. Sears, Mr. A. W. Bovell was appointed Senior Examiner, Rice Grading Office, as from April 13, 1932.

EXPENDITURE.

3. The total vote assigned to the Department by the Legislature at its Session for the year 1932 was $110,377. The following expenditure was voted on Supplementary Estimates during the year 1932.

Unfixed Establishment.—

	Excesses to be met from savings on other sub-heads.
House Allowances to Agricultural Instructors	...$ 60 00
Wages for boys (Rice Grading) ...	... 50 00

Other Charges.—

Allowances for Upkeep of bicycles ...	... 14 00
Travelling Expenses ...	... 1,175 29
Library and Publications ...	... 40 00
Freight, Insurance, etc. ...	... 200 00
Miscellaneous	... 100 00
Provision and Maintenance of Scientific Apparatus and Equipment	... 100 00
Contingencies	... 74 92
Upkeep of new Rice Mill (Working costs) ...	... 200 00
	$2,014 21

TABLE I.

ANNUAL ESTIMATES.

No. of Sub-vote.	Sub-vote.	Balances Unexpended.	Excess Expenditure.
1 (1-34) ...	Personal Emoluments—Fixed and Unfixed	$ 1,043 05	
2-3 ...	Travelling Expenses	...	$ 1,172 63
4 ...	Library and Publications	...	2 31
5-9 & 22	General Expenses	...	174 46
10 ...	Provision and Maintenance of Scientific Apparatus...	...	35 86
11-12	Botanic Gardens, Government Gardens and Grounds	20 61	
13 ...	Purchase, Production and Distribution of Seeds, etc.	14 07	
14 ...	Experiment Stations	632 37	
15 ...	Live Stock—Purchase and Maintenance of	298 98	
16 ...	Grants-in-aid for Exhibitions, etc.	378 21	
17 ...	Miscellaneous Expenses, Rice Grading	183 22	
18 ...	Subsidies	43 95	
19 ...	Agricultural Apprentices	14 55	
20-21 ...	Veterinary and Plant Pest Preventive Measures	347 21	
23 ...	Special Soil Survey	70 82	
25 ...	Upkeep of new Rice Mill	...	199 87
	TOTAL	$ 3,047 04	$ 1,585 13

The payments into the Treasury during the year were as follows:—

Agricultural Stations	...$1,019 04
Sale of Bees	... 46 16
Livestock Division	... 527 33
Botanic Gardens, Economic and Ornamental Plants	... 520 57
Sale of Official Publications	... 96
Rice Grading Fees (Georgetown and Essequibo)*	... 327 27
Milling Fees, Rice Mill, Anna Regina ...	... 308 65
Internal Revenue—Auction Duty ...	... 59
Miscellaneous—Sundries	... 71 28
	$2,821 85

*Rice Grading Fees are collected by the Customs Department and in 1932 amounted to $7,415.60. The amount shown under this sub-head is for sale of guide samples, etc.

METEOROLOGY.

4. The following are abstracts of the Meteorological observations recorded at the Botanic Gardens, Georgetown, and at the Penal Settlement, Mazaruni, during 1932 :—

Meridian of longitude for calculation of time adopted as standard in the Colony	...	...	...	60° W.
Hours slow of Greenwich time	...	...	...	3.45

Georgetown.

5. The Meteorological Station is situated in the Botanic Gardens at a distance of 1.45 miles south of the coast-line. The hours of observation are 7 a.m. and 1 and 6 p.m., local official time, which is 3.45 hours behind Greenwich time. The height of the barometer is 6 feet 6 inches above the mean sea level.

6. During the year 1932, the air temperature in the shade as recorded by the dry bulb thermometer, for the months of January to March, was lower than the mean shade temperature recorded over the period 1846-1931. The highest temperature recorded was 90.5° F. on September 17, while the lowest was 71.0° F. on the night of January 14. The mean shade temperature was 80.9° F. or 0.5° higher than the average from 1846-1931. The total rainfall was 90.51 inches as compared with 69.26 inches in the year 1931 and with 87.84 inches for the period 1880-1931. The total rainfall from January to April inclusive, was 31.20 inches as compared with 7·57 inches in the year 1931. April was an abnormal month—a fall of 15.06 inches being recorded—which was the highest monthly total for the year, and the highest for April since 1890. For the months of July to December, the rainfall was 32.70 inches or 7.25 inches below the average. Records of evaporation for the year are incomplete owing to repairs being necessary to the recording instrument, requiring its despatch to England. From January to August the total evaporation was 40.19 inches, being 56.86 per cent. of the total rainfall for the same months. The total amount of bright sunshine for the year was 2,674.8 hours as compared with 2,650.5 in 1931, and with 2,566.3 hours in 1930, and was 202.8 hours above the average from 1846–1931. The mean radiation temperature (blackened bulb in vacuo) was 5.6° higher than normal and was 0.7° F. lower than that of the previous year, the maximum monthly record during the year being 161°F. on October, 10. The mean minimum temperature on grass was 2.1° higher than the average. The mean velocity of the wind was 6.54 miles per hour, the maximum velocity being 21.25 miles per hour recorded on January 16.

Mazaruni.

7. The sub-station at the Penal Settlement, Mazaruni River, is in longitude 58° 38′ 45″ W. and latitude 6° 23′ 35″ N. at a distance of 42 miles south of the coast-line. The hours of observation are the same as at the main station in Georgetown. The height of the barometer is 55 feet above mean sea level.

8. During 1932 the mean shade temperature was 79.6° F., the maximum temperature recorded being 93.0°F. on November 4 and 5, while the minimum 65.0°F. occurred on February 12. The total rainfall was 84.53 inches or 1.12 inches higher than that of the previous year. The highest rainfall for the year was in May when 14.07 inches fell.

9. The total rainfall was 5.98 inches less than that of Georgetown. Rain fell on 197 days of the year as compared with 188 in Georgetown. The total amount of bright sunshine recorded during the year was 1,907.5 hours as compared with 2,674.8 hours at Georgetown. This total, however, is not accurate as owing to sickness and shortage of staff on 19 days no sunshine records were taken at Mazaruni.

10. The following table shows the mean rainfall for 1932 at the three counties and the average rainfall for the period 1923-1932 inclusive.

TABLE II.

MEAN RAINFALL AT COASTAL STATIONS.

Months.	Berbice.		Demerara.		Essequibo.	
	1932. Inches.	1923-1932. Inches.	1932. Inches.	1923-1932. Inches.	1932. Inches.	1923-1932. Inches.
January	6.63	8.32	9.72	8.15	8.86	8.21
February	4.26	3.89	2.51	4.11	3.34	4.82
March	9.79	4.07	6.30	3.79	6.44	3.61
April	18.52	5 85	16.18	5.35	11.23	4.92
May	9.38	10.99	13.53	12.49	14.81	13.22
June	13.75	12.24	13.89	13.90	15.62	14.59
July	8.03	10.67	8.24	11.15	11.68	12.22
August	9.45	5.52	7.62	7.26	7.71	8.29
September	2.61	2.53	1.13	2.90	1.83	3.54
October	1.85	2.24	1.89	2.96	3.32	3.76
November	.55	2.58	1.03	3.19	2.22	4.62
December	7.11	9.03	14.38	11.68	18.18	12.99
Total	91.93	77.93	96.42	86.93	105.24	94.79

From the table it will be seen that the rainfall was adequate for crop growth and was well distributed. This is reflected in the crop production statements contained elsewhere in this report.

PRINCIPAL CROPS.

Sugar.

11. Table III. shows the acreage, production and exports of sugar and its by-products for the eight years ending 1932.

TABLE III.

SUGAR.

Year.	Sugar Cane Acreage Reaped. English acres.	Sugar Produced from Area Reaped. Tons.	Yield per Acre Reaped. Tons.	Exports — Sugar. Tons.	Exports — Sugar. Total Value in Dollars.	Exports — Sugar. Value per ton in dollars.	Rum Produced. Proof Gallons.	Rum Exported. Proof Gallons.	Molasses Exported. Gallons.	Molascuit Exported. Tons.
1925	55,676	107,580	1.93	97,728	6,785,740	69.4	1,277,900	1,148,124	1,345,243	1,268
1926	55,728	98,152	1.76	84,659	6,060,257	71.5	1,622,966	789,643	2,017,862	1,075
1927	56,534	114,030	2.01	109,616	8,787,585	80.1	1,436,010	1,081,020	2,677,457	915
1928	53,489	116,484	2.17	114,687	8,124,666	71.0	1,745,293	1,269,923	2,873,468	1,832
1929	56,126	117,254	2.08	100,449	5,943,788	59.1	1,838,353	1,109,482	2,536,623	1,803
1930	54,264	127,764	2.35	114,542	5,418,884	47.3	1,571,371	846,319	3,851,337	400
1931	54,999	126,143	2.29	119,346	5,325,755	44.6	1,002,267	722,076	7,106,997	66
1932	55,240†	148,634†	2.69*	137,078	6,442,515	47.0	840,617	645,511	7,554,520	205

*See discussion in paras. 13 and 14.
†Includes farmers' canes.

12. There has been a further slight increase in the acreage devoted to sugar-cane and it appears likely that these small extensions will be maintained for the next few years although there is little prospect of any sudden and marked rise.

13. The total acreage of cane under cultivation in the Colony was 62,905 English acres. Of this amount, 53,909 acres, yielding 146,587 tons of sugar, were reaped on the sugar estates, whilst the total acreage reaped throughout the Colony, including farmers' canes, was 55,240 English acres yielding 148,634 tons. This represents a record for the Colony not only as regards total production but also in respect of yield per acre which reached 2.69 tons. These results are due in the main to favourable weather conditions and the extended use of flood-fallowing. The crop would have been even greater had certain estates not been forced to carry over to the new year canes which they found it impossible to take off during the end of the year grinding.

14. Despite the drastic cuts in expenditure which have been effected in recent years, the yield per acre continues to rise and it reflects great credit on all concerned that the average output per acre has risen from 1.97 tons of sugar in the

period 1925-1928 to 2.35 tons for the period 1929-1932. In 1932 more than 54 per cent. of the plantations' crop was produced on estates where the yield was 3 tons of sugar per acre or more, and one important property averaged 3.56 tons. As stated in the last annual report, the higher yields are obtained in Berbice and on the East Bank, Demerara. Berbice now produces 42 per cent. of the Colony's sugar and bids fair to produce an even greater proportion as time goes on.

15. From information kindly supplied by the sugar estates, it appears that the main variety grown is D. 625. It is, however, interesting to note that whereas this variety was being almost exclusively planted a few years ago, other canes are now receiving attention. Thus, there are more than 5,500 acres devoted to Diamond 10 and close on 700 acres to B.H. 10 (12). P.O.J. 2878 has shown up well in trials and in estate nurseries and is being very rapidly extended. From a few stools in quarantine in 1929 there were at the end of the year 200 acres in the Colony. Of the later Demerara seedlings 814/12, 663/13, 666/18, 835/18 and 602/22 are being tried on a commercial scale. S.C. 12.4 has also received some attention. In this connection the following comparative figures compiled from certain of the sugar estate returns will be of interest :—

YIELDS OF VARIETIES IN COMMERCIAL CULTIVATION.

Variety.	Plant Canes.			1st Ratoons.		
	Acres.	Juice Purity.	Commercial Sugar per English acre. Tons.	Acres.	Juice Purity.	Commercial Sugar per English acre. Tons.
D. 625	7,132	78·50	3·57	6,188	80·72	2·94
Diamond 10	1,507	80·42	3·79	889	...	3·35
B.H. 10 (12)	130	80·73	3·48	254	...	2·77
S.C. 12.4	48	83·73	3·61	4	...	2·63
D. 663/13	6	77·90	3·60	40	79·85	2·98
D. 814/12	6	81·94	5·71	9	83·58	3·06

16. *Research.*—The Sugar Experiment Stations' Committee comprised, in January, 1932 :

Director of Agriculture, Chairman.
Hon. G. E. Anderson, Pln. Diamond.
Mr. J. C. Gibson, Pln. Port Mourant.
Mr. A. Murison, Pln. Uitvlugt.
Mr. J. Bee, Pln. Albion.
Mr. C. Farrar, New Amsterdam, Berbice.
Hon. R. E. Brassington, Georgetown.

Its constitution was the same at the end of the year, the Hon. M. B. G. Austin having acted for Mr. Bee during the latter's absence from the Colony. Meetings were held at regular intervals. In accordance with the provision of the Sugar Experiment Stations' Ordinance, the Committee levied a cess of 25 cents per acre of cane for the maintenance of the sugar experimental work and this has undergone further considerable development during the year ; there being a close measure of co-operation between all officers concerned and the sugar estates' staffs. The ordinance for the control of Sugar Experiment Stations No. 7 of 1929 which normally expired at the end of the year was re-enacted as Ordinance No. 41 of 1932, the only important difference being that a cess not exceeding 30 cents per acre has been substituted for the present rate of 25 cents.

17. In view of the projected establishment of a central quarantine station for the West Indian region, no new importations of varieties have been made during the year, but some 40 varieties had been introduced during the previous three years and the collection now contains most of the varieties giving promise in other parts of the world. Some of these are still in quarantine but a number have been released and are being multiplied at the central station. It is hoped that some of them may

prove of value as sugar producers under local conditions, but the importance of the major portion to the work here will be in the production of new seedlings. There is reason to believe that in the many years of local breeding most of the combinations to be obtained from crossing the canes already in the Colony had appeared, and there was but slight chance of any markedly better cane being evolved. Since new West Indian "blood" has been introduced there has been a marked increase in the vigour of the seedlings. Of the seedlings produced last year, many were Demerara-West Indian crosses and many Demerara-Java crosses. This year it is hoped to back-cross some of these and introduced hybrids (*e.g.*, Java-West-Indian hybrids from Puerto Rico) to D. 625 and Diamond 10.

18. Multiplication, elimination and testing of seedlings has proceeded normally. A number of the older seedlings have now been eliminated while many others will be dropped in consequence of their poor performance in experiments reaped during the past two years. On the other hand, the tests have revealed several distinctly promising canes among the older imperfectly-tested seedlings, and a sturdy lot of 1928 seedlings have been put in experiments for the first time during 1932. 97 Demerara seedlings and 18 introduced varieties are now being compared in suitably replicated field tests. Of such tests, 21 were reaped during the year and 14 new ones started. There are now 34 variety trials in progress at the central station and on estates throughout the sugar belt.

19. The experiments so far reaped point to Diamond 10 and P.O.J. 2878 as likely to outyield D. 625, which standard cane still, however, gives satisfactory yields. As a consequence, planters are being advised cautiously to extend the two canes mentioned. Other canes which have shown up well ahead of D. 625 in one or more trials are: D. 92/17, D. 52/20, D. 207/20, D. 573/22, D. 895/22, D. 927/22 and S.W. 3. These are being submitted to further tests.

20. There has been a heavy demand for cuttings during the year both for establishing experiments and for sugar estate nurseries, and 3,044 bags equivalent to 425,000 three-eyed cuttings were distributed.

21. Eight manurial trials were reaped, and seven started during the year, there being now seventeen in existence. The results of these, as of the other trials reaped during the year, have appeared and are fully discussed in *Sugar Bulletin No. 1.* It will suffice to say here that these trials have amply demonstrated that the various soil types (*e.g.*, unflooded frontland, flooded frontland, and pegasse) have a differential response to manures and that the manurial problem is not, as some have maintained, solved or even identical over the whole sugar region. Thus it seems probable that whereas two cwt. per acre of sulphate of ammonia may suffice for plant canes on flooded frontland, this dose can be increased with advantage to four cwt. for plant canes on the same land unflooded and for ratoons on that land (whether previously flooded or not) and to six cwt. on pegasse.

22. Further trials with subsoil bamboo drains have continued to demonstrate increases in cane yield due to their use. Whether or not bamboo drains are used, there seems little doubt now but that improved drainage, in some form or other, will yield economic returns.

23. The practice of flooding land which has been thrown out to rest has become universal in the Colony and the operation is carried out wherever possible. While all are agreed that flood-fallowing brings about increased yields, there is considerable difference of opinion as to the effects of the depth of water, the duration of the fallow, the effect of vegetation (rooted or floating), etc. It was felt that an attempt should be made to measure the effect of the various factors. There are numerous, practical and technical difficulties in the devising and execution of such experiments,

but, with the help of the estate authorities at Port Mourant and Lusignan, four trials have been started. These have been designed :—

(1) To measure the effect of flood-fallowing for 4, 6 and 12 months respectively, with an application of one ton of limestone—
(*a*) before flooding and (*b*) after flooding.

(2) To determine what will be the effect on the yield of cane, after a six-months' fallow of—
(*a*) Maintaining such depth of water that the fallow is "clean";
(*b*) Lowering the water level to encourage the growth of semi-aquatic weeds and herbs;
(*c*) Sowing aquatic plants on the flood water;
(*d*) Adding 5 tons of molasses per acre to the flood water.

24. In addition to the cess mentioned in paragraph 16 above, an important contribution, referred to elsewhere, has been made to the Sugar Experiment Stations' funds by the Empire Marketing Board. This has enabled the flood-fallowing experiments and a greater number of variety trials to be undertaken, has permitted of the strengthening of the field staff and the purchase of a motor truck for transport of samples, etc. During 1933 a contribution of £400 will be made to the funds jointly by Messrs. Booker Bros., McConnell & Co., Ltd., and Messrs. Imperial Chemical Industries, Ltd. This is earmarked for trials with graded doses of sulphate of ammonia and it was in anticipation of this grant that several additional manurial trials were started towards the end of the year.

25. Research on the cane pests of the Colony has continued, notably in regard to moth-borer and hardback control. Reference to the former, for which assistance is being provided from the Colonial Development Fund, is made in para. 26. In this connection it is of interest to mention that late in the year, Dr. J. G. Myers of the Imperial Institute of Entomology, who is engaged in biological control work in the West Indies region, undertook a mission to the interior of the Colony and the Amazon area, one of the objects of which was to investigate the possibilities of securing an effective larval parasite of the moth-borer under British Guiana conditions. At the time of writing it can be stated that Dr. Myers' mission appears to have been successful in this respect and plans have been made to introduce this new parasite with the aid of funds provided by the sugar industry and controlled by the Sugar Experiment Stations' Committee. This effort will be fully reported on in the 1933 report.

26. *Grants-in-aid.*—(1) During 1932, the Empire Marketing Board made a free grant of £900 for a period of one year for the assistance of sugar research in this Colony, conditional on a fixed sum being provided by the sugar industry during the course of the year. This grant expires on June 30, 1933.

(2) In 1931, a free grant of £2,475 was provided from the Colonial Development Fund for three years to enable special moth-borer investigations to be undertaken. Reference to the annual report for 1929 will indicate the main lines along which these investigations are being conducted. The work undertaken to date may be summarized under the following heads:—(1) Moth-Borer damage in relation to sugar-cane varieties; (2) Direct control experiments—egg collecting; (3) Cutting-out borer and replacement experiments, all of which are still in progress. Reports are issued quarterly to the Director of Agriculture.

A Supernumerary Entomologist whose salary is also met from the Fund has been appointed for a period of three years, assuming duty in July, 1931. The investigations carried out by this latter officer are summarized under "Entomological Investigations" elsewhere in the report.

27. *Cane-Farming.*—The area under farmers' canes in the Colony was returned at 1,331 acres yielding 2,047 tons of sugar. Cane-farming has continued to be the

main occupation of the West Indian population residing in the East Demerara District. The other important cane-farming areas are at Lochaber and Rosehall Village, Berbice. The Department is endeavouring to induce the villages to take up cane-farming and in an effort to improve the situation the sugar estates agreed to fix a minimum price of $2 per ton of cane which has been increased to $2.20 for 1933. This work is but newly begun. The estates have also assisted with planting material while small distributions of improved varieties have been made from the Sugar Experiment Station to the more progressive farmers in the East Demerara villages.

28. At the present time the cane cultivations are generally in the nature of scattered small holdings and consequently the best economic results are unobtainable, mainly because no flood fallowing or irrigation can be done and also because small patches of cane are surrounded by other types of cultivations even swamp-grown rice. With a view to adjusting this, the Department undertook an educational campaign and inaugurated competitions in certain villages on the East Coast for the best block of sugar-cane of not less than 10 acres in extent grown on the co-operative block system. Unfortunately, the farmers have not responded to these efforts and the competition had to abandoned for 1932. Valuable money prizes are offered and farmers are urged to enter for the competitions, which will be run again in 1933, and to co-operate in a combined attempt to adjust their cultivations.

29. There has been some difficulty in regard to the price paid for farmers' canes in the Colony. The average price of farmers' sugar in British Guiana for the year has been $1.88 per 100 lbs. Calculating 12 tons of cane to make a ton of sugar, which is the figure given by the estates for farmers' canes, and deducting therefrom cost of manufacture, the price works out at approximately $2 per ton of cane. This equals the minimum price per ton of cane agreed to between certain estates and farmers, on a new scale of payment started this year, based on a minimum price of $2 per ton cane, and a sliding scale providing for increased payments depending on the price of sugar. As already mentioned the estates have now increased the amount to $2.20.

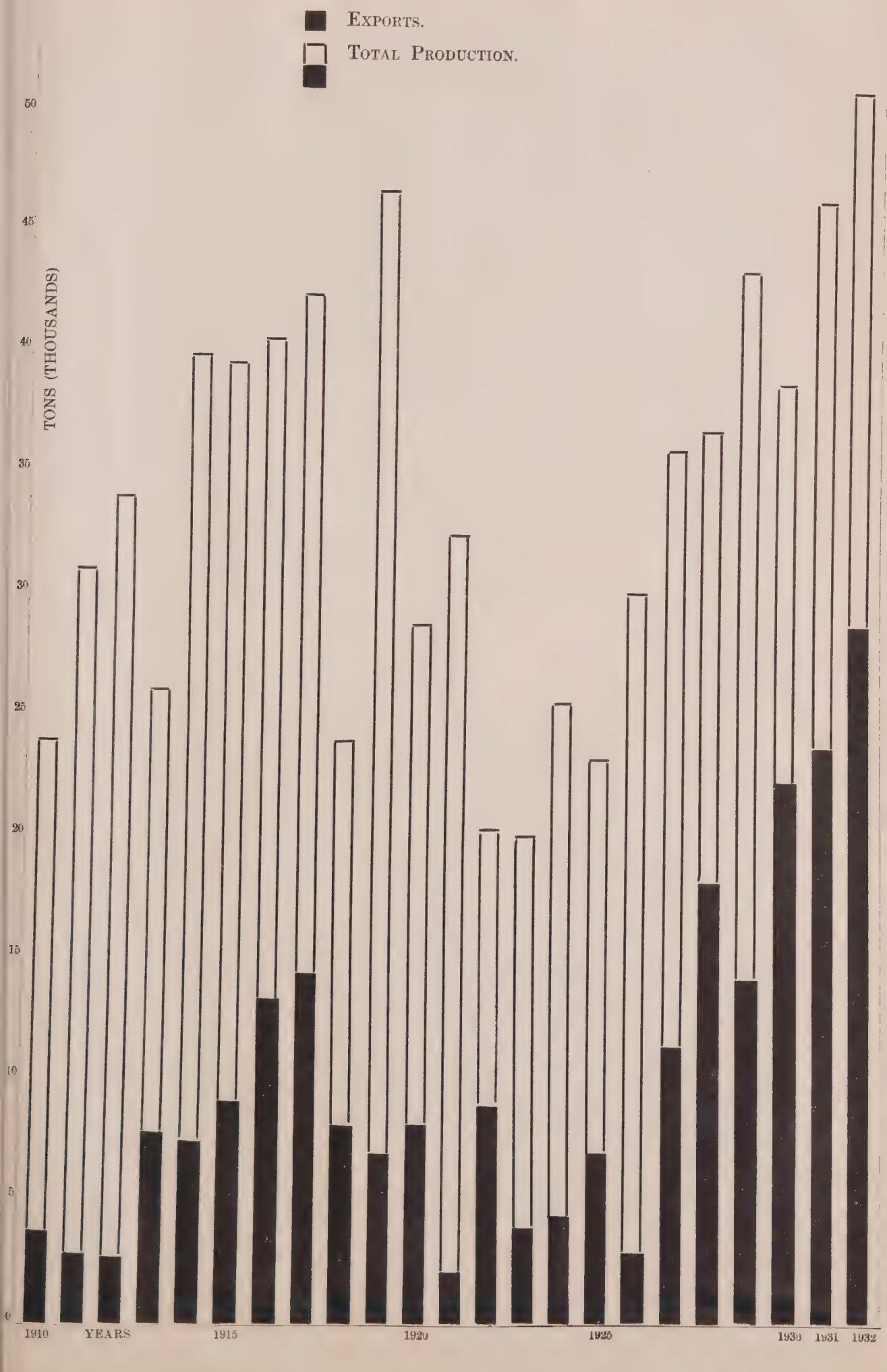
Rice.

30. The area occupied by this cereal during 1932 was 73,453 English acres but, including the second or spring crop, the area actually reaped was 87,941 acres. The yield was returned as 1,356,520 bags of 140 lbs. padi, equivalent to a yield of over 16 bags padi per acre. Yields vary considerably in different parts of the Colony; 30 to 40 bags per acre are obtained in some districts, while 20 to 25 bags per acre is the general average in most districts where transplanting is practised. In certain river areas seed is broadcast and in others an appreciable percentage of the spring crop is not resown but merely allowed to "spring" from volunteer padi (*i.e.*, shattered padi which falls from the ripened heads before and during reaping operations). In such self sown areas it is estimated that the average yield does not exceed 10 bags of 140 lbs. per acre. However profitable this practice proves to be, the average yield per acre for the Colony is undoubtedly depressed thereby.

31. The amount of rice exported was 28,541 tons with a value of $1,187,871 as against 23,632 tons with a value of $1,060,339 for 1931. The increase was roughly 5,000 tons over the exports of the previous year, and constitutes a record of exports from this Colony for any one year. A comparison of the export figures for 1923 with those of 1932 will indicate the tremendous strides made in the industry, both in regard to quality and quantity—but it is unfortunate that while new markets have been secured, notably in Jamaica and the French West Indies, the older markets of Trinidad and Barbados have been subject to constant fluctuation in regard to the annual volume of the trade. Indian competition, together with suicidal internal competition among exporters are the main factors responsible for the uncertainty of the trade in Trinidad particularly. Towards the end of the year

DIAGRAM 1.

PRODUCTION AND EXPORTS OF BRITISH GUIANA RICE, 1910-1932.



the position was further aggravated owing to the heavy rice crop being harvested and the very severe drop in prices. It was considered that, if some organisation could be brought into being having for its objects the fixing of prices for export, based on world's prices, and the control of the trade generally, greater confidence would be established in our principal markets resulting in greater stability both in the internal and external trade in this commodity. Accordingly, after considerable discussion and the combined efforts of the Rice Committee of the Chamber of Commerce, and the Department of Agriculture, a Rice Marketing Board was formed with the objects indicated after receiving legislative sanction at the Annual Session of Council. The Board is invested with statutory powers to grant licences to all exporters of rice, to revoke an exporter's licence whenever it is found necessary to do so, and to fix the minimum price of rice for export. Provision is also made in the ordinance for the Board to enforce the sale of rice by contract only; the exportation of unsold rice, that is rice on consignment, being prohibited, the Board will not allow its exportation unless the rice in question has been sold under a contract. Nevertheless, the Board has discretionary powers and it may grant permission, in writing, for the exportation of samples to prospective purchasers, or of consignments to special markets. The cost of maintaining the Board will be borne by assets accumulated from the fees not exceeding two cents, derived in respect of every hundred pounds of rice exported in accordance with the provisions of the ordinance, in addition to the revenue from licences issued by the Board. Further reference to the important features of the bill, which is to be given a trial for six months, will be found under "Agricultural Legislation."

32. Diagrams I. and II. depict production, exports and export prices of rice over the 23 year period 1910-1932 inclusive.

33. Table IV. gives particulars of rice production and values for the past eight years.

TABLE IV.

RICE.

Year.	Area Reaped (Spring and Autumn Crops) English Acres.*					Yields.		Exports.		
	Berbice.	Demerara.	Essequibo.		British Guiana total acreage (reaped).	Padi tons.	Rice tons (60% yield of cleaned Rice from Padi)	Rice.		
			Mainland	Islands				Tons.	Total Value in dollars.	Value per ton in dollars.
1925 ..	17,383	10,619	9,105	4,858	41,965	38,403	23,042	6,918	523,964	75·7
1926 ...	25,112	11,588	9,837	5,580	52,117	49,899	29,939	2,914	218,146	74·8
1927 ...	20,182	14,507	13,240	5,123	53,052	59,748	35,848	11,497	723,871	62·9
1928 ...	22,028	17,886	12,356	6,182	58,452	61,144	36,686	18,083	1,114,147	61·6
1929 ...	28,121	20,962	11,023	6,636	66,742	72,096	43,257	14,091	876,407	62·1
1930 ...	26,689	18,399	10,786	7,608	63,482	64,252	38,551	22,480	1,090,385	48·5
1931 ...	29,217	34,955	10,445	8,875	83,492	78,424	47,054	23,632	1,060,339	44·8
1932 ...	29,218	37,275	12,556	8,892	87,941	84,783	50,869	28,541	1,187,871	41·2

* Instead of Rhynland acres in accordance with new legislation. A Rhynland acre = 1.052 English acres.

34. As indicated in the table above, the total acreage reaped throughout the Colony has shown a substantial increase over the previous year whilst there has been a corresponding increase in the total yield of padi, 84,783 tons being produced from 87,941 acres compared with 78,424 tons from 83,492 acres in 1931.

35. The heavy continuous rains which prevailed from March to June hampered the reaping of the spring crop on the Lower East Coast, Demerara, while in the Berbice District the early broadcast crops were, for the most part, lost. In the Mahaica-Abary District the heavy rains flooded and practically destroyed the whole of the autumn crop which had been seeded early. On the cessation of the rains, nurseries were hastily started and about 50 per cent. of the area usually under cultivation was planted, and 600 acres of new land also taken in. This, combined with the extra yields obtained from the transplanted area, compensated for the decrease in the area usually sown, resulting in no apparent shortage in the total

output from the district. In the Essequibo District, including the Islands, large crops were grown. The long dry season which followed greatly hampered yields from small areas but, nevertheless, the crop throughout the Colony was an excellent one and, as stated above, constitutes a record.

36. *Investigation of Demerara Rice by Dr. Aykroyd, Lister Institute.*—Through the courtesy of Mr. Charles E. Douglas who visited British Guiana during the latter part of 1929, for the purpose of reporting on rice prospects in the Colony, a copy has been received of a paper entitled "The Effect of Parboiling and Milling of the Antineuritic Vitamin B_1 and Phosphate Content of Rice," published by W. R. Aykroyd, M.D., in the "Journal of Hygiene" for April, 1932. This paper contains the results of some interesting experiments with British Guiana rice carried out by Mr. Aykroyd in the Division of Nutrition, Lister Institute, England. As is well known, the commercial rice produced in this Colony is of the parboiled type. Samples of such rice were forwarded by the Department and these were used by Mr. Aykroyd in his investigations. The Department is indebted to Mr. Douglas for his co-operation and help in this matter.

37. In one experiment, the average weekly growth increments of rats receiving (a) samples of raw rice, milled and unmilled, (b) samples of parboiled rice, milled and unmilled, all fed as 65 per cent. of a purified diet deficient in vitamin B_1 are recorded. The results indicate that unmilled raw rice and both unmilled and milled parboiled rice could induce rapid increase in weight when fed as 65 per cent. of the purified diet free from vitamin B_1. On the other hand, the animals on the diet containing milled raw rice showed a speedy decline.

38. Further experiments were conducted to show the average weekly growth increments of rats on a purified diet deficient in vitamin B_1 supplemented with daily doses of various rice products obtained by separating in a hand rice mill. The samples of unmilled raw rice and unmilled parboiled rice were found to contain an equal percentage of phosphoric anhydride, and were about equal in vitamin B_1 value. The milled products of these rices, however, showed great differences in vitamin B_1 content. The specimens of raw milled rice were extremely deficient in this vitamin; the animals fed with this rice failed to grow, and in many cases developed polyneuritis. The milled parboiled sample of similar origin was only a little poorer in vitamin B_1 than the original rice in the unmilled state. Daily doses proved it to be only slightly inferior to the unmilled rice, while by increasing the doses, growth in the animals was excellent. Parboiled rice polishing, on the other hand, was found to have a lower vitamin B_1 and phosphate content than polishings from raw rice.

39. The results of these experiments show why parboiled rice is more nutritious than ordinary white rice, since the interesting fact is disclosed that when rice is parboiled the endosperm absorbs vitamin B_1 at the expense of the germ and pericarp, and milling does not remove the vitamin. Phosphorous compounds diffuse through the grain in a similar manner. In other words, the parboiling process, as it were, washes in the desirable properties which are not then removed in milling.

40. The fact that it is possible to produce a highly milled and polished variety of parboiled rice with the colour of "Demerara Super" and which retains its vitamin B_1, its phosphorous contents and at the same time possesses a desirable appearance, is certainly a matter of practical and economic importance.

41. As the investigator points out:—"It is often difficult to persuade communities liable to beri-beri to discard the more attractive and more palatable polished rice in favour of an undermilled variety; prejudice might, however, be overcome by the substitution instead of milled rice, of good quality, previously parboiled, which is pleasing to the eye and palate, and may contain enough vitamin

DIAGRAM 2.

AVERAGE ANNUAL EXPORT PRICE (F.O.B.) OF BRITISH GUIANA RICE, 1910-32.

B_1 to prevent beri-beri. It would be worth while to investigate, from the practical and clinical sides, the advantages and disadvantages of highly-milled parboiled rice as a staple cereal."

42. Another point of practical importance emerges with regard to the lower grades of parboiled rice which are produced locally and exported in large quantities. It should be emphasised that these are often so dark in colour that soaking or vigorous washing before cooking is practised to improve the appearance. Now milled parboiled rice readily loses the vitamin B_1 when soaked in water, this valuable property passing into the water. Therefore, when rice is soaked in water which is thrown away before cooking, the nutritive value of the rice is greatly depreciated. The obvious lesson for this Colony is to endeavour to get rid of all those practices which result in the production of a dirty coloured rice, *e.g.*, bull-mashing during threshing and the use of dirty water and incorrect steaming in the parboiling process.

43. The producer of Demerara rice should aim at the elimination of such undesirable factors, thereby improving the colour of his rice, its nutritive value and its selling price. Because grading is done on colour and breakage, an improvement in colour will not necessarily improve the grade when there is a high percentage of breakage present, but it will certainly improve the nutritive value of the commodity. Within limits, the colour of a sample of rice is more important to the producer than the breakage that it contains. With our modern separating machines a large percentage of undesirable breakage may be removed whereas the colour of the sample is fixed. It should be added that considerable improvement is taking place locally in regard to colour.

44. *Research.*—Replicated field tests (scientifically planned and laid out, and the results statistically examined) of the different varieties of padi have been continued and selections multiplied for distribution. The following blocks of pure line padi were established for seed supply.

Henrietta Station, Essequibo ...	... 5acres.
Wakenaam	... 5 „
West Demerara	... 10 „
Central Experiment Station, Georgetown	... 10 „
Nonpareil	... 10 „
West Coast, Berbice	... 10 „
Corentyne, Berbice	... 10 „

45. At the Central Rice Station, Georgetown, the supply of pure seed has been maintained by making single plant selections from the rice collection and growing these in progeny row plots of about 300 plants per plot. Varieties which show signs of promise in these preliminary trials are then carefully tested in randomised blocks. Altogether 58 varieties are at present under experiment or observation.

46. A large number of crosses were made towards the end of 1931 and owing to favourable climatic conditions the third generation of hybrids was planted out by the end of 1932. One of the main objects being to reduce the growing period without reducing the yield, crosses were made between the local variety, Demerara Creole, and several early maturing American varieties, namely, Americano 1600, Mexican Edith, Lady Wright, Blue Rose and Viola. Attention is being paid particularly to the following crosses :—

Americano 1600 x Demerara Creole,
Mexican Edith x Demerara Creole, and
A. 16.34 x H.7,

as being the most promising. Many crosses have been abandoned as economically valueless owing to an apparent incompatibility of parents which is made manifest by varying degrees of sterility in the F_2 plants.

47. Variety experiments were carried out at the Central Experiment Station, Georgetown, and at the Henrietta Experiment Station, Essequibo. At the latter station only three varieties were tested, namely, No. 79, Blue Stick and Demerara Creole, of which No. 79 was very definitely the highest yielder. No difference was apparent between Blue Stick and Demerara Creole.

48. At the Central Experiment Station, Georgetown, two variety experiments were conducted : (*a*) with six medium or long grained varieties ; (*b*) with three short (or barley) grained varieties and No. 79, included for comparison. In the first trial the order of merit was No. 79, Ramcajara, Kalyaman, H. 7, Demerara Creole and A. 16.34. The last named, a Burmese variety, besides being significantly lower than the others in yield has the added disadvantage of maturing in six months, which is rather too long for local requirements. There were no significant differences between the first four. In the second trial, no differences in yield were detected between the varieties No. 79, Kristna Kata Kalu, Lead Rice and Hope. The position at present, therefore, is that several varieties are under observation which are as good as, or better than the old standard variety, Demerara Creole, and ultimate selection for distribution will depend upon relative merits as regards other desirable features. At present, No. 79 is increasing in popularity, especially in the East Demerara District, since on both field performance and milling qualities results from this variety have been eminently satisfactory.

49. A spacing experiment was conducted at the Central Experiment Station, Georgetown, in which 6 x 6, 8 x 8 and 10 x 10 inch spacing with 2, 4 and 6 plants per 'clump' were tried out. The limits included were not wide enough to set definite limits as to spacing though results indicate that the optimum is about 8 x 8 inch spacing with 4 plants per clump.

50. The manurial experiment referred to in paragraph 52 of the 1931 report was continued at the Georgetown Experiment Station in order to estimate any residual effects of the various manures applied the previous year. Statistical analysis showed that only one treatment, namely, superphosphate gave a significant residual effect. In the original experiment the dressing of superphosphate gave an increased yield of 154 lbs. per acre. In two years, therefore, this dressing was responsible for an increase of 249 lbs. padi per acre. Under these circumstances, it would appear that the application of phosphatic manures to padi lands is not an economic proposition. The results from the trial are set out hereunder :—

	Lbs. padi per acre.	Percentage of mean.
With Superphosphate	2,955	101.6
Without Superphosphate ...	2,860	98.3
Difference	95	3.3
Mean	2,908	100.0
S.E. of Mean	28	0.96

51. In the report of the Chemical Division for 1931 it was indicated that although padi yields in the East Demerara experimental area had decreased gradually in recent years, no combination of fertilisers tried in the experiment brought about paying increases in yield. It was further suggested that the preponderance of magnesium among the exchangeable bases of the soil might possibly have had a depressing effect upon yields. An examination of composite soil samples collected indicate that heavy yields of 4,800 lbs. padi per acre were produced on soils containing a preponderance of exchangeable magnesia. It seems probable, therefore, that some growth inhibiting factor governs the effect of added fertilisers on padi soils and investigations are proceeding in an endeavour to elucidate this point. Generally speaking, however, it may be stated that comparing results in other countries the indications are, *from the experimental results obtained to date*, that rice cultivation in this Colony has not reached a point where diminishing fertility resulting in pecreased yields will respond to *economic* fertiliser treatment.

52. *Threshing Machinery Trials.*—Machinery trials were conducted at the Central Experiment Station, Georgetown, with the following machinery, obtained with the assistance of the Colonial Development Fund :

(*a*) Threshing machine and 5 H.P. Engine costing $900 f.o.b. Liverpool, from The Bon Accord Engineering Co., Ltd., Aberdeen, Scotland. This machine combines threshing and winnowing and delivers the winnowed padi into bags.

(*b*) Winnowing machine from The Bon Accord Engineering Co., Ltd., Aberdeen, Scotland—propelled by hand.

(*c*) Seed selection machine from Messrs. Lewis Grant, Fife, Scotland.

53. A demonstration was given to farmers on May 4 at the Experiment Station, Georgetown, and the economics of threshing and winnowing have been worked out for purposes of comparison with the primitive methods of hand-threshing and hand-winnowing. The results obtained are tabulated below.

54. The 1½ H.P. Thresher referred to was lent by Messrs. Booker Bros., McConnell & Co., Ltd., and is supplied by them at a cost of $280 complete with engine.

(1) ECONOMICS OF THRESHING.

	Bags Padi Threshed per 8 hour day.	Expenses per 8 hour day.	Cost per bag (140 lbs.) including depreciation.
Hand Threshing	4½	$ .50	$ .11
1½ H.P. Thresher	49	3.08	.08
5 H.P. Thresher	90	4.11	.08

These figures are inclusive of depreciation which reckoned at 10 per cent. per annum, will amount to 1.7 cents in the case of the small thresher and 3.3 cents in the case of the 5 H.P. thresher.

(2) ECONOMICS OF WINNOWING.

	Expenses per 8 hour day.	No. of Bags (140 lbs.) winnowed in 8 hours.	Cost per bag (140 lbs.)
Wind winnowing	$ 1.04	21	$ .05
Machine winnowing	1.52	48	.03

55. It is felt that the primitive methods of beating padi off the straw by hand, or driving bullocks round on a threshing floor, must give way to mechanisation if rice is to be produced economically on a large scale. Naturally, it will take time to make an impression on the small individual farmer, whose entire crop can be comfortably handled by his family. On the other hand, with the help of the District Commissioners, interest is being stimulated in village areas, where the acreages are sufficiently large to justify the introduction of mechanical means. Unfortunately, owing to the low price of padi, these demonstrations are not yet fully appreciated, the farmers, in most cases, preferring their primitive methods to paying a nominal charge of a few cents per bag for threshing. It is, however, intended to continue these demonstrations in the various districts during the coming year.

56. *Seed Selection Machine Trials.*—The seed selection machine consists of two sloping cylinders rotated by hand. The seed padi is fed at the upper end and, on passing down the cylinders, falls through a wire mesh into three grades according to thickness, the idea being that the larger grains will produce more vigorous plants and, therefore, a greater yield than the smaller grains. This theory is open to controversy and is referred to by Hayes & Garber thus :—" A current popular belief is that plants from large or heavy seeds yield more than plants from light or small seeds. The data collected by various investigators do not substantiate this view."

57. The machine in question separates the padi efficiently into three grades as is shown below :—

Grade.	Weight of 100 grains.		Mean Length.		Mean Width.	
	Gms.	S.E.	mm.	S.E.	mm.	S.E.
Small	2.76	.047	7.17	.028	2.13	.007
Medium	3.04	.018	7.32	.025	2.16	.006
Large	3.13	.021	7.34	.023	2.19	.006
Unseparated (Control) ...	3.06	.041	7.24	.029	2.18	.008

58. The weight of 100 grains is the mean of 10 observations and the length and width were obtained by measuring 200 grains. The four grades were planted out in a randomised experiment and the mean yields obtained are shown in the following table :—

Grade of Seed.	Yields—lbs. per acre.
Small	2,142
Medium	2,310
Large	2,282
Unseparated	2,268
Significant Difference	287

No significant differences were obtained between the yields of the four grades. The experiment is being repeated on a much larger scale with the varieties Demerara Creole and No. 79 as the variation in yield of the four grades has been very slight.

59. Most cereal seeds have more than sufficient reserve food than is necessary to give the plant a start until it can assimilate for itself. This is particularly the case with padi which is sown on the surface of the soil, and where the primary leaf can start assimilating almost immediately after emerging. It is highly probable, therefore, that under normal conditions a large proportion of the endosperm is wasted, and a small seed is out on an even footing with a large one. Mass selection of this kind within a pure line is of no value. If, however, the seed padi is a mixture of strains varying slightly in length (as is suspected in the case of Demerara Creole), the continued use of this machine might eliminate smaller grained strains, with a consequent beneficial effect on the crop after several seasons.

60. *Pure line seed padi distribution.*—The extension of the area under pure line and its distribution to accredited farmers has been one of the Department's main lines of endeavour during the past year. The same scheme as was in operation during 1931 for the establishment of pure seed blocks, throughout the various rice-growing districts of the Colony, from funds provided by the Colonial Development Fund, has received the full attention of the district staff. Unfortunately, the depressed state of the rice market has caused some hesitancy among farmers in the purchase and use of pure seed, notwithstanding its demonstrated superior quality and productiveness. This has been accentuated by the unduly heavy and continuous rains which caused great loss to early planted nurseries in a number of rice areas which had not before used pure line seed. The demand for highest quality seed has been met from Government stocks, held under the scheme, and by certificated growers themselves engaging in the sale of seed, in small lots, at rates often below what it was possible to quote at the padi barns. Up to the end of the year under review no financial loss had occurred in respect to the operation of the five year Revolving Fund of £800 available at the beginning of 1931, but the risk of loss increases with the expansion and extension of the area under pure line padi in the Colony. In order, therefore, to surmount this difficulty it is proposed to operate during 1933 a pure line padi loan scheme having for its objects the maintenance of purity of

already established pure line areas, the increasing of the area under pure line padi, and increasing the volume of pure line padi available for distribution. Under this scheme, pure line strains of padi will be multiplied at the District Stations and 'loaned' to farmers, provision being made therein for payment by the farmers unless seed of sufficient purity is returned. This work will form part of the Experimental Stations' operations, and no additional expenditure will be involved.

61. *Grants-in-Aid.*—No additional grants were made this year for the assistance of the rice industry; the funds provided during 1930 and 1931 from the Colonial Development Fund were again employed during the year under review. These grants are as follows:—

(A) A free grant of £1,700 ($8,160) to meet the cost of the erection of padi barns and the purchase of weighing machines.

(B) A free grant of £850 ($4,080) to meet the salary of the Plant Breeder for three years.

(C) A loan of £800 ($3,040) free from interest repayable at the end of five years to provide a revolving fund for the purchase and distribution of pure line seed padi.

These grants were made on November 29, 1930.

62. Work on the erection of the padi barns has been completed, reference to the 1931 report will show where these have been built. These barns were utilised for the storage of seed grown for distribution and multiplication in the various districts.

63. Mr. L. E. W. Codd, Plant Breeder, has been placed in charge of the rice experimental work at the Central Rice Station, Georgetown, where he has been engaged in carrying out experimental and breeding work, reference to which has already been made.

64. Reference to the pure line distribution work is made in para. 60 above.

65. A further grant of £1,820 ($8,736) was made on August 11, 1931, from the Colonial Development Fund for the purchase of a rice mill and various units of rice machinery.

66. This rice mill, obtained from Messrs. Lewis C. Grant, Fife, Scotland, has been erected at Anna Regina, Essequibo. Commercial experiments undertaken to date indicate that it is capable of turning out a high quality white rice but the same success was not secured with parboiled, although it was originally claimed for the mill that it is capable of turning out both types. The experiments and trials undertaken with the other units of machinery obtained from this source are summarised in para. 54.

67. *Grading.*—From January 1 to November 30, 1932, all consignments of rice leaving the Colony were examined and graded under the Rice (Export Grading) Ordinance, 1930, the regulations made thereunder, and the Amended Rice Grading Regulations of 1931.

68. During the latter part of the year, the Department of Agriculture in conjunction with the Rice Committee of the Chamber of Commerce found it necessary to alter, modify and improve these regulations, and adjust the main defects in the previous system. To this end, new legislation was designed, and the Rice (Export Grading) Ordinance, 1932, together with its accompanying regulations came into force as from December 1. The Rice Grading Ordinance, 1930, did not legislate against the fluctuation of quality in a given consignment of a specific grade. Consequently, when bags of one quality were found among bags of another quality within the same consignment, the Rice Grading Inspector was obliged to issue a certificate based upon the lowest quality that happened to be detected. This procedure was undesirable.

69. The new Ordinance, which is really an amendment to the previous legislation and has to be construed with it, provides that all consignments of rice for export, except those which fall into the "Super Broken" and "Broken" class, should be uniform in their quality. In other words, rice for export must be previously subjected to a process of blending so that the quality of one bag in any given consignment of a specific grade does not differ in any way from that of another. In order to be certain that this necessary process of blending has been adequately performed, an application for grading will not be accepted unless it is accompanied by the certificate of a registered blender which states that the rice in question has been blended according to the requirements of the law. Registered blenders are appointed, on application, by the Director of Agriculture, provided that the applicant produces certificates of character and evidence of previous experience in the blending of rice. Their names are published in the "Official Gazette," and their licences are liable to cancellation when, upon official inspection, the Grading Officer finds that a consignment of rice has not been satisfactorily blended. The introduction of compulsory blending of rice for export will, without doubt, increase the commercial value of the grading operation and tend to make the grading certificate a negotiable document.

70. In order to encourage the exportation of a higher quality of low grade rice to meet the requirements of certain of our West Indian markets certain alterations have been made in the description of the grades. The amended grade classification is now as follows:—

Class.	Description.	Colour.
Whole Grain Super ...	Not to contain more than a total of 5 per cent. of broken and/or discoloured grains...	As per guide sample.
Super	Not to contain more than a total of 12 per cent. of broken and/or discoloured grains.	Do.
No. 1	Not to contain more than a total of 25 per cent. of broken and/or discoloured grains.	Do.
No. 2	Not to contain more than a total of 35 per cent. of broken and/or discoloured grains.	Do.
No. 3	Not to contain more than a total of 50 per cent. of broken and/or discoloured grains.	Do.
Broken (Super) ...	Same general colour standard as whole grain super or super; containing more than 50 per cent. broken and/or discoloured grains.	...
Broken	Any colour below super; containing more than 50 cent. broken and/or discoloured grains.	...
White Rice Quality A....	To be dry, reasonably clean, white; not to contain more than 5 per cent. of discoloured grains. (Grains may be of irregular size and broken).	As per guide sample.
White Rice Quality B....	To be dry, reasonably clean, white; containing more than 5 per cent. of discoloured grains. (Grains may be of irregular size and broken).	Do.

Minor amendments, all providing for improvement in quality of the product for export and tightening up generally of the previous regulations, have also been introduced into the ordinance.

71. Throughout the year, the methods of analysing rice samples have remained the same. Bulk samples of rice are accurately mixed and reduced to smaller proportions by the use of the Boerner Sampler, a device which is admirably suited for its purpose, while the small Grantex Separating machine continues to function satisfactorily in the removal of broken grains.

72. The following table gives full particulars of rice exported during 1932, according to grades:—

TABLE V.

AMOUNT OF RICE GRADED IN BRITISH GUIANA—1932.

Months.	Whole Grain Super.	Super.	No. 1.	No. 2.	No. 3.	White Rice.		Super Broken.	Broken.	Total No. of Bags.
						A.	B.			
January ...	180	5,250	2,789	20,220	3,700	...	65	195	360	32,759
February ...	784	5,848	4,789	25,146	3,965	15	12	145	185	40,889
March ...	525	5,019	4,739	26,027	2,817	4	62	245	316	39,754
April ...	227	5,678	4,899	25,502	6,542	110	34	405	356	43,753
May ...	250	4,545	5,119	13,050	7,560	22	112	512	735	31,905
June ...	50	2,390	1,661	8,903	5,199	22	42	266	432	18,965
July ...	...	4,028	1,742	11,710	7,548	19	144	335	564	26,090
August ...	...	3,682	1,054	9,736	6,516	12	35	125	330	21,490
September ...	...	3,086	1,251	13,652	4,771	38	1	80	150	23,029
October ...	...	4,916	2,684	17,167	4,080	44	4	135	357	29,387
November ...	...	5,235	5,353	27,362	7,395	108	19	149	147	45,768
December ...	...	2,151	3,021	12,468	10,342	100	70	248	41	28,441
Total ...	2,016	51,828	39,101	210,943	70,435	494	600	2,840	3,973	382,230

73. *Rice Mill Legislation.*—The investigation into the milling methods adopted in British Guiana, undertaken by the Divisional Agricultural Officers and reported on in the Administration Report for 1930, indicated, amongst other things, that the system of soaking padi was with few exceptions generally impracticable, the water used for soaking varying in quality from ordinary trench water to clean artesian well water. It was stressed that "high quality parboiled rice could never be made where dirty water was used, however good the padi." Consequent on this it was felt that the present basis on which the rice mills were operated required overhauling with a view to securing greater efficiency in milling practices.

74. The question, therefore, of the registration of rice mills on approved lines and under strict regulation has been receiving the full attention of Government during the year under review, and an Ordinance entitled "Rice Factories Ordinance" is now before the Legislative Council. The main objects of the proposed legislation are :—

(1) To ensure that all rice mill sites are inspected and approved by the District Commissioner and Government Medical Officer of Health.

(2) To provide for the licensing of all mills with a view to more effective control of milling operations, including check of stocks on hand, padi purchased, weights and measures, etc.

(3) To provide for inspection by the Director of Agriculture, District Commissioner and Government Medical Officer of Health or any officer authorised by them.

Coconuts.

75. The area under coconuts in 1932 was 23,301 acres. The exports for 1932 were as follows :—Coconuts, 962,300 valued at $10,484 ; coconut oil, 19,048 gallons valued at $10,239 and copra, 757 tons valued at $48,936.

76. From the figures furnished in Table VI. it will be seen that there has been an increase in the area under coconuts but there has been a decrease in the export of nuts, approximately 530,000 less than that of the previous year. This may be attributed, in some measure, to the utilisation of this product in the local manufacture of the edible oil product—Fryol—by Messrs. Wieting & Richter, Ltd., who erected a factory for this purpose during the latter part of 1930. The beneficial influence of this venture is further evinced by the fact that there has been a decline in the importation of edible oils, 144,350 gallons being imported in 1932 as compared with 187,062 gallons in 1931 and 350,802 gallons in 1930. A further decline is recorded in the export of copra which fell to 757 tons in 1932 or approximately one-fifth of the quantity exported in 1929.

77. Coconut cultivators in several districts requested help from Government during the year and the Chamber of Commerce has made representations on behalf of the industry. It was proposed, following existing legislation in Trinidad, that by the imposition of a tax on imported edible oils, Messrs. Wieting & Richter, Ltd., would obtain sufficient benefit for their locally manufactured product "Fryol" to enable them to pay a somewhat higher price for copra than was prevailing in outside markets. The whole question was engaging the attention of Government at the close of the year.

78. Coconuts in this Colony are for the most part not 'cultivated' but are planted out and then left largely to fend for themselves. As a consequence, yields are poor, and wilt disease is of common occurrence in neglected areas. Despite the fact that the prevailing conditions are often unfavourable to these palms, the practice of applying manure to this crop is practically unknown in the Colony, although considered to be an operation of considerable importance in most coconut growing areas in other lands.

79. The Coconut Caterpillar (*Brassolis sophorae L.*) occurred throughout the period under review in varying degrees of intensity, dwindling practically to nothing

towards the end of the year. It was never sufficiently conspicuous to obtrude itself upon the attention of the farmers in general, though two reports of its occurrence were received through the District Officers. A station was started at Plantation Hope, East Coast, Demerara, for the purpose of carrying out biological control work, but was closed owing to lack of funds.

80. The following table gives particulars of coconuts, coconut oil and copra during the period of 1925–1932 :—

TABLE VI.

COCONUTS.

Year.	Acres under cultivation (English)* acres.	No. of Nuts Exported.	Value in Dollars.	Copra Exported, lbs.	Value in Dollars.	Coconut Oil Exported gallons.	Value in Dollars.
1925	31,434	1,363,280	34,303	1,935,110	96,110	30,394	30,601
1926	27,880	815,917	18,739	3,820,468	190,055	18,778	18,620
1927	29,235	334,185	6,019	2,605,818	116,525	25,326	25,271
1928	29,456	321,635	5,939	7,841,944	352,522	26,244	24,426
1929	29,456	637,812	10,614	8,420,965	314,350	20,862	16,730
1930	28,052	629,371	7,845	4,503,099	143,423	26,377	16,059
1931	22,882	1,494,195	13,538	3,093,086	82,629	20,742	9,254
1932	23,301	962,364	10,484	1,694,650	48,936	19,048	10,239

*Instead of Rhynland acres in accordance with new legislation. A Rhynland acre = 1.052 English acres.

Coffee.

81. The area under this crop in 1932 was 5,800 acres. The exports were 1,054,451 lbs. of cured coffee valued at $69,436 as against 795,489 lbs. valued at $33,582 in 1931. It will be seen from Table VII. that there has been an increase in the area under this crop of approximately 1,000 acres over the previous year while the exports have created a record, there being an excess of 118,803 lbs. over the exports of 1919 which was the previous record year. This substantial increase in exports and acreage over those for 1931 is to be viewed with satisfaction since it reflects favourably on the economic condition of the main coffee producing districts of the Colony, viz., the North West District, the Pomeroon and the Canals Polder areas, despite the low prices obtaining.

82. Liberian coffee is the Colony's fourth most important crop, and is ideally suitable for the small farmer on pegasse soils, since it makes vigorous growth in such areas with but little attention, and "holds" its berries so that picking can be carried out over extensive periods.

83. When prices are favourable this crop not only benefits the small farmer considerably, but offers possibilities for cultivation on a larger scale. The market, however, is limited, and its present restricted condition entails priority being given to the better prepared beans, while inferior grades sell with difficulty. There has, however, been a slight upward tendency in prices during the period under review.

84. The peasant proprietor is beginning to realise that a small area, more intensively worked by himself and his family, is a sounder proposition than a larger acreage, worked with the aid of paid labour, seldom exploited to its optimum extent, and which has to be abandoned when prices fall. The more ambitious and industrious farmers aim at obtaining the maximum yield from their acreage—good land can be made to yield upwards of 1,000 lbs. per annum—and pay careful attention also to the preparation of their beans. The ruck are content with a smaller and lower grade production, which together with the corn and provisions that their land can carry, suffices "to keep the wolf from the door."

85. Table VII. shows the acreage, exports and value of this crop from 1925 to 1932:—

TABLE VII.

COFFEE.

Year.	Area cultivated (English) acres.*	EXPORTS.	
		lbs.	Total Value in Dollars.
1925 ...	6,569	668,029 ...	114,593
1926 ...	5,499	773,257 ...	132,623
1927 ...	5,546	430,543 ...	68,844
1928 ...	6,201	919,772 ...	137,933
1929 ...	6,212	907,026 ...	104,135
1930 ...	5,363	367,371 ...	22,400
1931 ...	4,899	795,489 ...	33,582
1932 ...	5,800	1,054,451 ...	69,436

* Instead of Rhynland acres in accordance with new legislation. A Rhynland acre = 1.052 English acres.

MINOR INDUSTRIES.

Para Rubber and Balata.

86. The area returned under Para Rubber was 880 acres as compared with 827 acres in 1931. Owing to the low price of rubber and the universal presence of Leaf Spot disease this crop can no longer be considered amongst the Colony's exports.

87. The exports of Balata (*Mimusops Globosa*) were 5,700 cwt. valued at $149,194 as opposed to 6,433 cwt. valued at $203,376 in 1931. The market for this product has become very restricted in recent years.

Cacao.

88. The area returned under cacao is 791 acres.

89. There is a continued interest in this crop being taken by some individuals, and the Botanic Gardens' nurseries have received several fairly large orders for seedlings.

90. The old cocoa bearing lands mostly situated on the Berbice and Demerara Rivers, have become, by neglect, heavily infested with witch broom, the eradication of which at present would be impossible. It is of the utmost importance that every precaution be taken to keep this disease from spreading to newly planted areas. In this respect, it may be noted that the North West District, where a certain amount of cocoa has been planted recently, is so far apparently free of this disease. A pamphlet has been distributed among the farmers of the District pointing out the importance of maintaining this healthy state of affairs.

91. Table VIII. shows the area under cultivation and imports of this commodity since 1925.

TABLE VIII.

CACAO.

Year.	Area cultivated (English) acres.*	Cacao exported. lbs.	Raw Cacao and prepared Cacao imported. lbs.
1925 ...	2,021	none	218,306
1926 ...	1,356	,,	174,085
1927 ...	1,322	,,	166,539
1928 ...	1,265	,,	153,760
1929 ...	1,514	,,	123,972
1930 ...	1,514	,,	114,282
1931 ...	953	,,	131,585
1932 ...	791	,,	71,821

* Instead of Rhynland acres in accordance with new legislation. A Rhynland acre = 1.052 English acres.

Citrus.

92. The area under citrus and other fruit was 316 acres, exclusive of limes.

93. During the year the cultivation and output of budded citrus plants from the nurseries in the Botanic Gardens and North West District has been maintained. The production of budded citrus is an expensive operation, and it was found that the low prices charged hitherto had resulted in the placing of promiscuous orders by many who had either no intention of taking the plants when they were ready, or who took but little care of those that they obtained.

94. An increase in price was made at the beginning of the year, which served very soon to distinguish those who were genuinely bent on citrus cultivation from others who hoped to get something for practically nothing. As a result orders were reduced to reasonable quantities, and by the end of the year nearly all bookings for grapefruit had been fulfilled and it was hoped to wipe off the arrears of oranges booked early in the following year. Although a higher price was charged per plant, consideration was given to those placing large orders in cases where the Department was satisfied that the site selected was satisfactory and the trees likely to be well cared.

95. The large output of plants in 1931, required all the available space in the Botanic Gardens' nurseries for their production. As a consequence, when these plants had been lifted, a period of over a year elapsed before the stock of saleable plants could be brought up to the required numbers again. A large number of plants were basketed at the end of the year, but were not ready for sale until early in the following year. Hence the total number of plants sold for 1932 is lower than that for the former year, although the area in the Gardens devoted to the production of budded citrus was actually increased, a number of beds at the Experiment Station being employed, in addition to those in the nursery. The large number of plants which were almost ready at the end of 1932 will, therefore, be included in the distribution figures for 1933. Indeed, at the time of writing this report, the number distributed is practically double that of the whole 1932 period.

96. Besides the raising of plants in the Botanic Gardens, a large number of seedling stocks were budded with standard varieties of grapefruit and orange at Hosororo in the North West District. These are required for the most part to fulfil orders placed by farmers in that district.

97. Trinidad rendered valuable aid in supplying budwood of standard varieties of orange and grapefruit throughout the year as successive batches of seedlings were raised. In addition to budding with recognised varieties of orange, however, it was felt that some of the better types of sweet oranges grown in the Colony should be able to find a local market, or be of use for private consumption, and so a quantity of budwood was taken from selected trees of known good quality, and plants raised. These are to be sold at a rather lower price than the standard varieties.

98. The following table indicates the distribution of citrus plants during the past three years :—

TABLE IX.

DISTRIBUTION OF CITRUS—1930-1932.

	Demerara.			Berbice.			Essequibo.			North West District.			Total Distribution.		
	1930.	1931.	1932.	1930.	1931.	1932.	1930.	1931.	1932.	1930.	1931.	1932.	1930.	1931.	1932.
Budded Oranges ...	114	550	118	18	70	210	44	180	66	190	90	...	366	890	394*
Budded Grapefruit ...	111	104	154	54	618	229	103	595	50	...	252	380	268	1,569	813*
Budded Limes ...	...	216	...	...	2	...	100	50	...	...	1,818	1,195	100	2,086	1,195
Seedling Limes ...	...	1,042	3,200	...	3,900	...	...	100	...	...	4,718	3,021	...	9,760	6,221
Total ...	225	1,912	3,472	72	4,590	439	247	925	116	190	6,878	4,596	734	14,305	8,623

* See discussion in para. 95.

99. The area under cultivation with limes during 1932 was 787 acres; 958 gallons of concentrated lime juice valued at $920 and 730 gallons of essential oil of limes valued at $44,728 were exported. The synthetic production of citric acid is somewhat of a menace to the market for these products. A large number of surplus lime seedlings, however, which had been raised at the Hosororo Experiment Station and which were distributed free of charge were taken by certain farmers interested in lime cultivation. Caution is being advised in regard to extension of this crop.

100. The following table gives statistics bearing on the citrus industry;—

TABLE X.

CITRUS.

Year.	Area under limes (English) acres.*	Area under other Citrus (English) acres.	Concentrated Lime-juice Exported. Gallons.	Essential Oil of Limes Exported. Gallons.
1925 ...	689	...	8,430	306
1926 ...	689	...	4,974	277
1927 ...	705	...	5,249	273
1928 ...	695	..	8,124	440
1929 ...	635	...	12,717	801
1930 ...	740	...	11,373	660
1931 ...	747	254	8,347	590
1932 ...	787	316	958	730

* Instead of Rhynland acres in accordance with new legislation. A Rhynland acre = 1.052 English acres.

Provision Crops.

101. The area under ground provisions (a name used collectively for plantains, bananas, corn, cassava, sweet potatoes, tannias, yams, peas, beans, etc.) was returned at 17,135 acres as compared with 17,575 in 1931. There is a small decrease in acreage in some of the East Coast villages due to the fact that the farmers are beginning to realise that they cannot compete in the open market with ground provisions from the river districts, and the area under ground provisions is being reduced to areas more commensurate with village requirements. It is, however, gratifying that many farmers are cultivating crops in more marketable quantities and discarding the old method of miscellaneous mixture—many items of which are unmarketable. The expansion expected in peas and beans has been disappointing although every effort was made, including free distribution of large quantities of seed, to achieve the result. The production of black eye peas is, however, being maintained although there has been no appreciable increase.

102. With regard to sweet potatoes, experiments were started during the early part of the year with special soil in large concrete pots, the object being to determine the effect of soil and varying treatments of lime on their flavour—a local variety and a Barbados variety being tried. These pot cultures made very poor growth with a correspondingly poor yield of small tubers, "strings" in most cases heavily infested with "scarabee"; therefore no conclusions can be drawn. Generally speaking, pot cultures of a tuberous root crop yield little or nothing in value.

103. A large number of cuttings of the best of the imported varieties have been distributed and been received with favour. Damage from weevils and from insects is common but sanitary measures in the field, namely, the destruction of all débris left over from the previous crops (more particularly in regard to small potatoes) is essential. The moulding up of exposed tubers and immediate reaping of mature crops will also materially assist in their control. The following figures showing the imports and value of this vegetable since 1929 are significant indicating greater production locally:—

Year.	Quantity Imported lbs.	Value in Dollars.
1929 ...	1,850,490	30,557
1930 ...	1,211,486	18,878
1931 ...	1,054,805	16,275
1932 ...	869,500	13,119

104. In the Divisional Report for 1931 of the Agricultural Superintendent, Berbice, mention was made of a preliminary manurial trial with sweet potatoes. The experiment consisted of dressings of nitrogen, phosphate and potash, singly and in all possible combinations. The results indicated that only dressings of sulphate of ammonia were effective. It was pointed out that this experiment was in the nature of a survey trial and that other experiments with varied doses of sulphate of ammonia would be carried out during 1932. A further trial with dressings of 1 cwt. 2 cwt. and 3 cwt. per acre of sulphate of ammonia has been reaped. The yields from the experimental area were disappointingly low and applications of ammonia, while they brought about considerable increases, did not produce heavy yields. It seems that with this crop a dressing of sulphate of ammonia at the rate of 2 cwt. per acre may be advised with some confidence.

105. There has been a slow but steady increase in the area under truck and market garden crops and an increasing demand for imported seed. The cultivation of tomatoes on systematic lines has been stressed in the various villages, particularly in the East Demerara District, where conditions are suitable for extended cultivation. The soils best suited to this crop are the sand reefs and adjoining loams; clay soils are unsuitable unless very efficiently drained and thoroughly tilled and prepared. As an incentive, seed and seedlings have been distributed from Sub-Station Cecilia where experiments have been conducted since 1928 with freshly imported seed from the United States of America and England. During the year under review, over 3,000 seedlings grown from such seed have been distributed in addition to 250 lbs. of ripe tomatoes, given as a source of seed supply to those farmers who visited Cecilia. While there has been improvement in the general class of tomato grown, individual farmers are still reluctant to plant on a little larger scale and this together with an inadequate water supply during dry weather and neglect of pruning and general training of the plants, is retarding expansion. There is a good local demand for fresh tomatoes which is never met and it is felt that if a few farmers suitably situated would systematically cultivate the crop, a remunerative local industry could be built up.

106. Another truck crop that is attracting considerable attention at the moment is onions. From the year of re-organisation the Department has been importing seed from Teneriffe and the increasing demand, each year, is indicated by the following comparative figures:—

Year.	Quantity of seed imported from Teneriffe.	Number of seedlings distributed.
1928 ...	36 lbs.	...
1929 ...	28 lbs.	...
1930 ...	35 lbs.	10,650
1931 ...	47 lbs.	24,000
1932 ...	94 lbs.	10,200

107. In order to surmount the difficulties experienced by the average farmer in raising seedlings, due to poor preparation of the nurseries and lack of attention in watering and shading, a sustained effort has been made to induce the farmers to improve their nursery methods. As a further incentive, competitions have been started in the various districts of the Colony for the best block of onions grown from seed obtained from the Department, the area to be not less than 5 square rods, the seedlings being grown by the competitor. Great interest has been displayed and a number of entries received but, unfortunately, the heavy rains which prevailed towards the close of the period under review greatly retarded growth. The results from these competitions will not be available until 1933.

Pineapples.

108. In the report for 1931 it was reported that a company of local capitalists had been granted the lease of a tract of land at Amsterdam, Demerara River, for pineapple cultivation. This Company is registered as "The British Guiana Fruit & Canning Company, Limited."

109. In March, 1932, a visit was paid to the concession by His Excellency the Governor, accompanied by Mr. F. A. Stockdale, Agricultural Adviser to the Secretary of State for the Colonies, the Director of Agriculture, and various members of the Company. The plants showed great variations in the growth, suggestive of patchy fertility of the soil. Some of the most vigorous were found on the site of burnt out tree stumps. There was evidence, too, that the plants were in every instance suffering from the high soil temperatures which sandy soils develop in the tropics, many of the lower leaves being scorched.

110. It was agreed that the cultivation of the whole area needed the assistance of artificial manures and it was therefore accepted by the parties concerned that the manurial experiments which the Department of Agriculture had planned for 1931 and which through certain decisions of the Company had to be unavoidably delayed, should be proceeded with as early as possible.

111. Early in April, the above mentioned fertiliser trial was laid down as a Randomised Block of 5 replications of each of the following treatments:—

11 lbs. Sulphate of Ammonia, 9 lbs. Sulphate of Potash, 11 lbs. Superphosphate per plot.
22 „ „ „ „ 18 „ „ „ „ 22 „ „ „ „
33 „ „ „ „ 27 „ „ „ „ 33 „ „ „ „
22 „ „ „ „ 18 „ „ „ „ 11 „ „ „ „
22 „ „ „ „ 9 „ „ „ „ 22 „ „ „ „
Control—No manure.

Each plot contained an average of 382 plants, equivalent to 1/37th. acre in size.

112. The plants were not ready for reaping at the end of the year but periodical reports were made on their growth, as compared with the rest of the 15–20 acres planted. In August a very marked difference was noticeable between the fertilized and unfertilized pines. When the trial was begun the plants had a starved appearance, there were large areas with a reddish yellow appearance and the lower leaves on the majority of the plants showed definite damage by sun scorch. In August, however, the plants had a healthy olive green colour, with more leaves, and the average height had increased to 2½ to 3 feet.

113. Apart from the fertiliser trials, it was decided to experiment with light shade plants grown between the strips of pines. Of those planted, however, namely, Pigeon peas (*Cajanus indicus*), *Crotalaria striata*, *Indigofera sp.* and Sorrel (*Hibiscus Sabdariffa*) the germination and growth were very irregular and the results were negative.

114. Owing to the high humidity noticed under the existing conditions it was anticipated that trouble would arise through the incidence of 'browning' in the fruits. The presence of this disease was noticed in a number of instances. No pronouncement can be made in regard to the possibilities of this commendable venture until further data have been secured from the area under observation.

115. At the Department's station at Hosororo, North West District, the existing varieties of pineapple with the exception of Smooth Cayenne and Red Spanish, were transferred to the Henrietta sand reef, Essequibo, where extension work was contemplated. Owing to unfavourable weather conditions, and the incidence of pests and diseases, growth has been somewhat irregular.

Tobacco.

116. Despite the trials carried out in the Canals Polder area in 1931 and the instructions given to the respective growers, and monetary return obtained by some, the majority who had been interested discontinued cultivation for one reason or another. In the West Bank area there now remain but two serious growers of leaf tobacco. These farmers are encouraged by the Guiana Match and Tobacco Factory,

who import and distribute seeds. Owing to lack of equipment, the cultivation of tobacco in this area is subject to the variation in weather conditions, and 1932 was certainly not an ideal tobacco growing year. The varieties mainly cultivated are Yellow Mammoth and White Burley supplied by the Department and "Virginia" supplied by the Match Factory. The Botanist and Mycologist investigated a browning of the roots of certain tobacco plants during the year and suggested preventive measures.

117. Prices remain remunerative for the present small output which is chiefly of the nature of black fat 'plug tobacco' sold locally. Climatic and soil conditions are not favourable for cigarette tobacco.

Apiculture.

118. Of recent years there has been an increased demand for Empire honey, and a correspondingly increased supply. The industry is one that may be useful in British Guiana, and to this end, the Department of Agriculture has taken steps to encourage and increase the production of local honey.

119. At the beginning of 1932, the Department of Agriculture established and equipped a demonstration apiary, primarily for educational purposes. Directly after it was started, an attempt was made to produce honey, but the idea was abandoned in order to supply the demand for pure-bred Italian queens, and by their distribution to improve the quality of the local bees. Many of the large hives were, therefore, broken down into small nuclei to fulfil this object, so that the apiary consists at present of 10 hives and 28 nuclei. Queen bees are now bred from imported stock and distributed to the public as fast as they can be produced.

120. In February, 1932, the Director of Agriculture convened a meeting of the local beekeepers, and at this meeting the formation of a Beekeeping Association was suggested. The proposal was readily accepted and the British Guiana Beekeepers' Association was formed forthwith under the patronage of His Excellency the Governor.

121. The Association offers the following advantages to its members :—

(1) Tested Italian Queen Bees from the Department of Agriculture's apiary at 60 cents each to members. ($1.00 each to other individuals).

(2) Participation in any beekeeping competition organised by the Department of Agriculture.

(3) The supply of bee goods by local firms at a 10 per cent. rebate on all cash purchases.

(4) A preference by some of the local honey distributors.

(5) Access to bee magazines in the Department of Agriculture.

(6) Attendance at association meetings where papers are read concerning various aspects of beekeeping, especially with regard to local problems.

The annual subscription to the Beekeepers' Association is $1.00 for adults and 24 cents for juveniles. Moreover, the Department of Agriculture offered to supply free of charge, seedlings of local honey-producing plants, namely, logwood, fiddle wood, eucalyptus, cashew and genip.

122. During 1932, 49 queen bees were distributed to members of the association, and 13 queens to non-members. A total of 300 honey-producing plants were distributed to those individuals who applied for them.

123. It is evident that the members of the association are taking advantage of the facilities that it offers, especially with regard to the supply of queens. Their number, however, which by the end of 1932, amounted to thirty, is too small. The association is, however, in its infancy and in time its membership may increase, but until the association obtains the support of the majority of local beekeepers, the Department of Agriculture will be unable to achieve its original object in spite of the fact that it is prepared to give its support.

MISCELLANEOUS.

Forage Crops.

124. Plots of approximately half an acre each have been established at the Georgetown Experiment Station with the most promising of the fodder crops, *i.e.*, Guatemala Grass (*Tripsacum laxum*), Uba Cane, Elephant Grass (*Penniseteum purpurascens*), Wynne Grass (*Melinis minutiflora*), Guinea Grass (*Panicum maximum*), Para Grass (*Panicum barbinode*). These are being kept under observation to note optimum periods of cutting, yield, duration without re-planting, etc. Two similar areas have been established, one with Demerara Primrose (*Asystasia gangetica*) planted through the existing pasture grasses, and one with Horse Weed (*Alysicarpus vaginata*). It has been observed that the Demerara Primrose prefers semi-shade, but can also make good growth in the open once established. Horse Weed quickly establishes itself on ploughed land, and in a short time takes over the whole area, smothering everything else. An area is being established with Horse Weed to test its suitability for grazing. Under local conditions Guatemala Grass is undoubtedly the best fodder for cutting.

125. During the year under review, 13,975 plants of the various fodder crops were distributed from the Central Station alone.

Green Manures and Fodder Crops.

126. The experiments mentioned in the report for 1931 to determine the value of these crops in annual crop-practice and their suitability for planting between permanent crops were continued during 1932. The two most promising varieties for planting under coconuts and 'orchard crops' (coffee, citrus, etc.) are *Dolichos hosei* and *Calapogonium muconoides*, although *Indigofera endecaphylla* is also very promising. One of the most promising varieties for covering poor soils in the coastal belt is the Sword Bean (*Canavalia sp.*). It is interesting to note that at Sub-Station Cecilia, on an area on which it had hitherto been difficult to establish legumes, Canavalia is doing well. The sugar estates are evincing considerable interest in these various legumes, but unfortunately it has been very difficult to persuade the small farmer to grow them purely as a cover crop. Efforts are being made, however, to counteract this by encouraging the cultivation of Lima Beans and Bush Bonavist, which serve as food as well as being excellent cover crops.

127. A large quantity of seed, totalling approximately 980 lbs., has been distributed from the Experiment Stations during the year.

Poison Plants.

128. The cultivation experiments with fish poison plants of possible insecticidal value, which are in progress at Hosororo Station and Wauna Sub-Station in the North West District, were continued during the year.

129. The most promising of the plants, Black and White Haiari, occupy 5 acres at Hosororo and 4 acres at Wauna. This cultivation has brought to light one or two important points, having shown clearly the more vigorous growth of the white variety, as opposed to the black, and the better development of both in the open than under shade.

130. Samples of the young plants sent to Rothamsted Experiment Station for analysis, however, yielded disappointing results. The percentage of rotenone in the stems was very small, and even in the roots did not compare favourably with that obtained in other poison plants grown elsewhere commercially. The cultivation will be continued, however, in order to observe what root development may be expected as the plants grow older, and what percentage of rotenone these older roots will yield.

131. In the meantime another variety of Haiari has been discovered, which it is hoped to cultivate, and which may possibly yield a greater poison content.

CENSUS RETURNS.

132. The annual census returns of areas agriculturally occupied are now obtained and classified by the District Agricultural Officers. Formerly, these returns were collected by certain Government and Local Bodies indirectly connected with agriculture, but during 1931 and 1932 all agricultural census returns have been collated by the district staff. In accordance with new legislation all returns are given in English acres instead of Rhynland acres.

133. Tables XI. and XII. show the number of acres under cultivation during 1932 in the three counties of the Colony and also summaries for the past eight years.

TABLE XI.

Counties.	Nature of Crops and number of Acres under cultivation on December 31, 1932. (English acres).								
	Sugar Cane.	Rice.	Coconuts.	Coffee.	Rubber.	Cacao.	Limes.	Other Citrus.	Ground Provisions.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Berbice ...	21,840	29,218	3,979	38	...	37	533	44	3,420
Demerara ...	40,096	31,677	14,510	3,059	667	635	38	184	11,233
Essequibo ...	969	12,558	4,812	2,703	213	119	216	88	2,482
Total ...	62,905*	73,453†	23,301	5,800	880	791	787	316	17,135

* Includes area under farmers' canes—1,331 acres.
† Does not include acreage for the Spring Crop—14,488 acres—which is grown on the same land.

TABLE XII.

	Year.	Annual Summaries of the Acreages under cultivation during the years 1925, 1926, 1927, 1928, 1929, 1930, 1931 and 1932, together with the acreages for the same period for sugar-cane and rice. (English acres).*											
		Sugar-Cane.		Rice.		Coconuts.	Coffee.	Cacao.	Rubber.	Limes.	Other Citrus.	Maize, Plantains, etc., and Ground Provisions.	Total area under cultivation.
		Area cultivated.	Area reaped.	Area cultivated.	Area reaped.								
British Guiana	1925	57,500	55,676	30,858	41,965	31,434	6,569	2,021	2,315	689	...	12,324	143,710
Do. ...	1926	58,589	55,728	34,504	52,117	27,880	5,499	1,356	2,104	689	...	15,264	145,885
Do. ..	1927	59,271	56,534	39,283	53,052	29,235	5,546	1,322	1,895	705	...	14,576	151,833
Do. ...	1928	57,625	53,489	46,667	58,449	29,456	6,201	1,265	1,683	695	...	16,336	159,928
Do. ...	1929	57,247	56,126	55,745	66,742	29,456	6,212	1,514	1,474	635	...	14,283	166,566
Do. ...	1930	57,244	54,264	52,287	63,482	28,052	5,363	1,514	1,474	740	..	14,312	160,986
Do. ...	1931	61,097	54,999	77,478	83,492	22,882	4,899	953	827	747	254	17,575	186,712
Do. ...	1932	62,905	55,240	73,453	87,941	23,301	5,800	791	880	787	316	17,135	185,368

* Instead of Rhynland acres in accordance with new legislation. A Rhynland acre = 1.052 English acres.

COLONIZATION AND LAND SETTLEMENT.

134. The supervision of the Anna Regina Estates (comprising Anna Regina, Richmond, Henrietta and La Belle Alliance) and the Bush Lot Land Settlement was continued by the Agricultural Superintendent, Essequibo, until October, 1932, when the Estates were handed over to District Administration and the Department ceased control of the properties.

135. The same number of settlers occupied houses and land at Bush Lot as at the close of the autumn crop of 1931; it was not found necessary to remove any of the farmers, all families working their cultivations fairly satisfactorily. Improvements to the irrigation system enabled hitherto abandoned lots to be brought into cultivation and it is hoped to bring the remaining abandoned lots into cultivation with the 1933 spring crop.

136. The health of the settlers has not been satisfactory this year—malaria fever was the chief complaint—and 20 deaths as against 24 births were recorded. The drinking water supply continues to be unsatisfactory especially during padi cultivation when the water becomes very muddy.

137. For the first time since the settlement was opened two crops of padi were grown—the spring and autumn crops. Irrigation supplies for both crops were excellent and, with one or two exceptions, good crops were reaped. During the spring crop harvesting conditions were very unsatisfactory and this, combined with attacks from ducks, accounted for loss of a part of the crop, but on the whole yields were good—an average of 15 bags per acre was obtained. The padi reaped was excellent and was purchased by outside buyers at $1.32 per bag which price caused some dissatisfaction as extra labour and drying was necessary due to bad harvesting conditions.

138. Yields from the autumn crop, although satisfactory, were not as good as anticipated, and this was particularly noticeable on the land broken in for cultivation in 1929; taking the average yields the oldest land gave best returns. The crop although somewhat late was harvested under ideal conditions but some trouble with labour was again experienced this year due mainly to the larger padi acreages and the higher prices paid for harvesting on the adjoining estates. The prices paid for cutting and beating were somewhat lower this year—48 cents per quarter for cutting and $1.20 per quarter for beating were realised. Transport difficulties prevented the operation of the threshing machine on the Settlement as unless run on an even surface, satisfactory results are not obtained. The aggregate yield on the estates reached the figure of 30,863 bags or at the rate of 15 bags (156 lbs.) per acre over both crops.

139. Hand-winnowing, the most tedious harvesting operation, was overcome by the use of the power aspirating machine obtained through the Colonial Development Fund from Messrs. Bon Accord Engineering Company, Ltd., Glasgow, Scotland. The majority of the settlers availed themselves of this unit although its use was not enforced provided padi was clean winnowed. Although not guaranteed to reduce initial expenditure this machine winnows padi with the minimum of delay and this fact was soon appreciated by the farmers. At one period, 600 bags were weighed and stacked in one day which would have been impossible had hand-winnowing been done.

140. Unfortunately, on account of the chaotic state of the rice market when the 1932 autumn crop was mature, it was not found possible, as with previous crops, to dispose of the padi at harvest. As a consequence, to protect the tenants from speculators and to safeguard collection of rents, arrangements had to be made to finance the crop on the basis of an advance of $1 per bag of padi (156 lbs.) and to dispose of it as padi or milled rice according as sales could be made.

141. Owing to the low prices prevailing for ground provisions the provision farms were somewhat neglected although some settlers sold their produce to non-farming areas at Golden Fleece and Zorg where better prices were paid. Attempts to encourage the growing of black-eye peas, both as a food and cover crop, met with little encouragement. Special efforts have been made to get the settlers to take up onion cultivation on a large scale and two demonstration plots were laid out to illustrate different manurial treatments, namely, pen manure and sulphate of ammonia. Weather conditions retarded its extended cultivation; seedlings were lost owing to drought. Onions are a remunerative crop and it is hoped to demonstrate successfully that the crop, though needing careful attention, is a profitable one to grow.

142. Irrigation and drainage facilities have proved efficient but difficulty was experienced with some of the lowlying house-lots accumulating surface water during times of heavy rain caused by the overgrown state of the main drainage trenches.

143. Generally speaking, had padi prices been maintained at their previous high level many of the settlers would have been in a sound financial position, but with present prices it is all a man and his family can do to clear expenses. Times of low prices absorb profits made in good seasons. For a hardworking man there is a

good living in the Bush Lot Land Settlement, as can be seen by some of the farmers. Commencing at the settlement with nothing at all, one or two of the more thrifty workers now clear all expenses on a crop and have saved sufficient money to purchase steers and, in some cases, a cow as well. In this respect the farmers from India do better than the "creole" East Indians. The latter are not so thrifty nor, in many cases, so hardworking. Many of the farmers took up extra cultivation on the Anna Regina properties, some working as much as six and eight acres.

144. His Excellency the Governor, accompanied by Mr. F. A. Stockdale, Colonial Agricultural Adviser, the Director of Agriculture and Deputy Director of Agriculture, visited the Settlement in March. His Excellency the Officer Administering the Government visited the Settlement in September accompanied by the Director of Agriculture. Frequent visits were made both by the Director and Deputy Director during the year.

145. An analysis of the revenue and expenditure for 1932 as supplied by the Colonial Auditor is as follows:—

Recurrent Revenue.		Recurrent Expenditure.	
Bush Lot ...	...$ 2,692 56	Head Office, Typist and Stationery	...$ 172 13
Anna Regina *cum annexis* ...	5,740 35	Upkeep of Bush Lot ...	144 20
		Anna Regina *cum annexis* ...	5,384 46
Total Recurrent	$ 8,432 91	Total Recurrent	...$ 5,700 79

In addition, the extraordinary expenditure for capital works amounted to $1,399.76 and the extraordinary revenue amounted to $1,113.29 from sale of scrap, while all advances to tenants were recovered.

146. The position as set out above, taking all the circumstances into consideration, must be regarded as being very satisfactory; unfortunately, rice prices have shown a further serious and unexpected decline since the end of 1932 and this may be expected to reflect adversely on the financial position for 1933 as rents have had to be substantially reduced.

AGRICULTURAL INVESTIGATIONS.

147. Field investigations have been carried out at the centres mentioned below. The work undertaken and the results so far obtained with the various crops are given in detail in the divisional reports of the officers concerned, published separately, while the more important features of such agricultural research connected with the major and minor industries have been summarised elsewhere in this report.

Sugar Cane	—At Sophia Experiment Station, Demerara.
Do.	—At Pln. Diamond, E.B., Demerara.
Do.	—At Pln. Farm, E.B., Demerara.
Do.	—At Pln. Lusignan, E.C., Demerara.
Do.	—At Pln. Non Pareil, E.C., Demerara.
Do.	—At Pln. Ogle, E.C., Demerara.
Do.	—At Pln. Enmore, E.C., Demerara.
Do.	—At Pln. Cane Grove, E.C., Demerara.
Do.	—At Pln. Uitvlugt, W.C., Demerara.
Do.	—At Pln. Leonora, W.C., Demerara.
Do.	—At Pln. Port Mourant, Berbice.
Do.	—At Pln. Blairmont, Berbice.
Rice Hybridisation work; pure line selection work; varietal tests; spacing experiments; Ground Provisions (including bananas) and Vegetables; Tobacco; Mangoes; Green Manures and Fodder Crops	At Central Experiment Station, Georgetown.

Tomatoes; Onions; Soya Beans; Legumes; Sweet Potatoes; Chinese Yams; Green Manures; Tobacco; Grapes; Chilli Pepper	At Sub-Station Cecilia, E.C., Demerara.
Pineapples—Manurial experiments	At B.G. Fruit and Canning Company's Concessions, Demerara River.
Rice, Pineapples and various Gardens Crops	At Henrietta Experiment Station, Essequibo.
Rice	—At Pln. Port Mourant, Berbice.
Do.	—At Pln. Rosehall, Berbice.
Do.	—At Pln. Non Pareil, E.C., Demerara.
Do.	—At Pln. Hope, E.C., Demerara.
Do.	—At Windsor Forest, W.C., Demerara.
Sweet Potatoes; Oil Palms	—At Berbice Stations.
Coffee; Limes; Citrus and Other Fruits; Poison Plants; Oil; Palms; Fodder Plants; Spices; Green Manures; Tung Oil, etc.	At Hosororo Experiment Station and Wauna Sub-Station, North West District.

ENTOMOLOGICAL INVESTIGATIONS.

148. The following crop pests have received attention by the Supernumerary Entomologist for the period under review and remedial measures been recommended :—

(i) *Sugar.*—Hardbacks or Scarab beetles, *Dyscinetus geminatus* Faby. and *D. bidentatus* Burm. There were two outbreaks of this pest during the year. Both species cause serious loss to cane-farmers. The control is by flooding. The insect is attacked in all stages of development by the fungus *Metarrhyzium anisopliae.*

Yellow Sugar-Cane Aphis, *Sipha flava* Forbes. This pest becomes serious at times but is normally controlled by predators.

(ii) *Rice.*—There was a severe outbreak of the White Stem Borer, *Scirpophaga albinella* Cramer. during the year. It has an egg as well as a pupal parasite.

The Rice Weevil, *Calandra oryzae* Linn. is under investigation. Many experiments were carried out to test the insecticidal value of various substances popularly supposed to repel or kill weevils. These included various kinds of peppers, neme-bush, and the salting of the bags which, however, proved useless against weevils on a large scale. The effect of relative humidity on the hardness of rice and on the weevil was also investigated.

(iii) *Coconuts.*—A station for carrying out biological control work on the Coconut Caterpillar, *Brassolis sophorœ* L. was started at Pln. Hope, East Coast, Demerara. Sporadic outbreaks, which quickly subsided, however, occurred at points on the East Coast at different periods during the year under review.

Cockles.—*Strategus aloeus* Fabr.—attacks young coconut trees. Control is effected with calcium carbide.

(iv) *Pineapples.*—The Pineapple Bug—*Athaumastus laetus* Mayr. attacks pineapples in all stages and is indigenous on wild pines. An egg parasite has been found.

Red Stinging Ants, *Solenopsis sp.* is a pest on pineapples and builds its mud "sheds" on the plants.

(v) *Miscellaneous.*—The Coushi Ant, *Atta sp.* is very numerous on the coastlands where it is easily controlled with carbon bisulphide and in the interior where its control is a matter of great difficulty.

Orthezia sp. (Soft Scale Insect) is a frequent garden pest. It can be controlled by pruning and opening up.

Camila fusca Stoll. This caterpillar does a great deal of damage to valuable plants.

(vi) *Haiari.*—Experiments were tried to determine the insecticidal value of various extracts of Haiari with negative results.

BOTANICAL AND MYCOLOGICAL INVESTIGATIONS.

149. No serious outbreak of plant disease was reported during the period under review. Observations on D. 625 at Nickerie, affected by Mosaic disease, suggest that this variety is resistant to the disease, although liable to infection and exhibiting the usual external symptoms when infected.

150. *Phloem necrosis* of Liberian coffee, a serious factor in coffee cultivation in Surinam, has been confirmed by Dr. Stahel as the cause of sudden wilting of coffee bushes in this Colony. The causal organism is a species of *Phytomonas*, a small flagellate. Locally, only isolated bushes are affected as a rule, but in September one case was reported from the North West District where the disease had become prevalent over an entire grant. It was not, however, extensive elsewhere in the district.

151. Root Knot, *Heterodera radicicola*, was found to be heavily infecting tomatoes, potatoes and other vegetables growing on the sandy soil at the Forestry Department's Station, at H.M.P.S., Mazaruni. This is the first record of this disease for the Colony, but should it appear elsewhere on the sandy soils of the interior, it might prove a serious hindrance to the cultivation of vegetables.

152. Black Eye disease of pineapples appeared at the New Pineapple Company's cultivation on the Demerara River. This disease, well known in other pineapple growing areas, may prove a menace to the extension of this local cultivation. No effective method of control has been discovered.

153. A list of diseases of economic plants in British Guiana was submitted for publication in the Kew Bulletin in accordance with similar lists from other colonies

154. One of the original experimental plots of the imported Rice Grass, *Spartina Townsendii*, on the foreshore of Lilliendaal, showed it to be capable of becoming established, though slowly, on portions of the muddy foreshore covered by high tides. Plants were taken from this nucleus and set out at two other places on the East Coast, where the majority of them became rooted, and it is hoped will spread. Notes and observations were made on the extent and spread of the local Rice Grass (*S. brasiliensis*) which constitutes the greater part of the vegetation on the newly formed foreshore between Georgetown and Buxton.

155. A survey was made of the pastures and pasture grasses of the coastlands and a report submitted.

156. The experimental cultivation of fish poison plants in the North West District was inspected. It was found that while Yarroconalli, *Tephrosia toxicaria*, required a good deal of care for establishment, Black and White Haiari, *Lonchocarpus sp.* became easily established after clearing the bush, and needed only occasional weeding. The White Haiari grows more vigorously than the Black, both grow more vigorously in the open than under shade, and both thrive better on the sandy soils at Wauna than on the laterite at Hosororo.

157. The routine work of the Herbarium has been continued satisfactorily. Some 500 unnamed specimens collected by Jenman, Bartlett and others were sent to Kew for identification. Determinations were received from Kew of a number of plants collected on the Cuyuni River during 1931.

CHEMICAL INVESTIGATIONS.

158. The Chemical Division was short-staffed for the greater part of the year. Increased activity in the sugar laboratory necessitated the withdrawal of the laboratory assistant from the general laboratory. In addition, the Chemist-Ecologist was absent on leave for over five months.

159. The division was occupied with soil survey work on the coastlands, and is directly responsible for the detailed examination of some 34,000 acres of cane land. While no expeditions have been made into the interior, numerous soil samples, collected by Government officers on tour, were examined. A number of advisory visits were made to plantations and soil samples were submitted frequently by managers. Preliminary examination of nearly 6,000 soil samples from the cane lands of the Colony demonstrates the marked variability in properties between the cane soils of different districts. In some areas these are highly acidic, while in other regions they are markedly saline. During the last twenty-three years drainage, irrigation and the continued use of sulphate of ammonia, have lead to a very definite increase in soil acidity. Profile pits in the two main soil types (the front land soils and the pagasse soils) of the cane lands have been sampled and examined in great detail.

160. The results of a preliminary scheme of manurial experiments laid down by the Department indicate that these two soil types possess widely differing fertiliser requirements. It was recognised that these results required further corroboration. Facilities were not at once available, but recent grants by Messrs. Booker Bros., McConnell & Co., Ltd., and by the Imperial Chemical Industries, Ltd., have permitted the establishment of a chain of field trials.

161. The problem of flood-fallowing has received a certain amount of laboratory attention and, with the assistance of the Empire Marketing Board, four field trials connected with this problem were initiated. Attention is called to the detrimental effects on cane growth of concentrations of soluble salts. The possible utilisation of final molasses on the cane soils of the Colony has received some attention.

162. Collections of padi soils have been submitted to detailed laboratory examination. No explanation of the fact that, although yields at the Experiment Station are on the decline, fertiliser applications produce but small increases, is forthcoming. The Department is confronted with a problem similar to that outlined in a recent publication by the Malayan Agricultural Department. It is possible that heavy manuring combined with closer planting may lead to crop increases. It seems, however, that the application of artificial fertilisers to the majority of the Colony's padi soils will not, at present, prove an economic procedure. It may be advisable, in the future, to concentrate upon the evolution of strains of padi which possess, among other desirable characteristics, a marked propensity towards the efficient utilisation of heavy dressings of fertilisers.

163. The fertiliser requirements of the sweet potato have continued to receive attention during the past year. An experiment with graded dressings of sulphate of ammonia indicated that an application at the rate of 2 cwt. per acre might be employed with advantage.

AGRICULTURAL EDUCATION AND EXTENSION.

District Experimental Work and Instruction.

164. The Agricultural Officers continued to assist in the carrying out of manurial experiments and variety trials on sugar estates where such were in progress in their districts. In addition to helping the specialist officers in the planting and

final reaping of the experiments, they were able to inspect the experimental areas from time to time, carry out any urgent work and report on the progress of the various tests and crop conditions generally.

165. Agricultural education is forwarded by these officers in addition to visiting and conversing with individual farmers, by the organisation and periodical supervision of school gardens and juvenile agricultural clubs. Further reference to school gardens is made under the head "School Gardens."

166. Farmers are further encouraged by the arrangement of competitions for miscellaneous crops and also for padi in those districts where this cereal is grown.

167. A feature of the District Officers' work in the period under review has also been the conducting of experiments and demonstrations with various minor crops such as coffee, cocoa, tomatoes, onions, etc., to try and induce farmers to pay greater attention to these as an alternative to rice and ground provisions.

168. Rice Grading is supervised by the Agricultural Superintendents in cases where the product cannot be graded in Georgetown.

169. Finally, the collection of agricultural census figures and general advisory work throughout their districts enables these officers to follow the general trend of the different phases of agricultural activity, to encourage those on the up grade and to try and arrest any falling off of interest where such may become evident.

Agricultural Associations.

170. *District Agricultural Committees.*—Recommendations were made to Government in 1930 for the establishment of District Agricultural Committees, and reference to para. 135 of the 1930 Administration Report will indicate the scope of the work proposed to be undertaken. The question has received further consideration during the year and it is hoped to inaugurate two Committees in the East and West Demerara Districts during 1933.

171. *Buxton-Friendship Farmers' Union.*—The Buxton-Friendship Farmers' Union, which is affiliated to the British Guiana Producers' Association, held their second annual meeting on August 16 at Buxton Village, East Coast, Demerara. The Association has been formed primarily with the object of promoting farming in the Buxton-Friendship area, and of improving the lot of farmers in the district by co-operative means. In the foreword of the special bulletin embodying the Proceedings of the Meeting, the Director of Agriculture stated :—

> "The Buxton-Friendship Farmers' Union is one of the most fortu-
> "nately placed organisations of its kind, because it has come into existence
> "in a centre where much development on co-operative lines may take place
> "in an industry—the cane-farming industry—which is of considerable
> "interest to all races in the Colony, but to West Indian agriculturists in
> "particular."

The Director of Agriculture presided at the meeting and addressed those present on agriculture generally, stressing the importance of extending cane-farming on the co-operative block system. Papers read by officers of the Department were :—"Cane Farming" by the Cane Agronomist; "Rice, Tomato and Onion Cultivation" by the Agricultural Superintendent, East Demerara; "Rice and its Improvement by Breeding" by the Plant Breeder; "Fruit Cultivation in the Colony" by the Superintendent, Botanic Gardens; and "Insect Pests" by the Entomologist.

172. In connection with their second anniversary the Union staged a Fair for its members. Though lacking in quantity, the quality of the exhibits was good and it was gratifying to note an awakened interest being evinced in market garden crops. Peas and beans, however, were poorly represented, it being difficult to

persuade farmers to cultivate these, even though seed be given them. An exhibit of special interest featured an attempt to dry surplus crops for preservation and conversion into manufactured products suitable for local sale and consumption.

173. None of the other agricultural associations showed any great activity during the period under review.

Co-operative Credit Banks.

174. The Credit Banks still continue under the chairmanship of the District Agricultural Officers. Proposals have, however, been submitted for improving the existing method of control if the banks are to remain under the supervision and direction of the Department of Agriculture.

175. There were on December 31, twenty-seven banks on the register—15 in Demerara, 8 in Berbice and 4 in Essequibo. At the close of the year the membership of the 27 banks was 10,990 ; West Indians own 48,541 shares and East Indians 27,628 shares out of a total issue of 83,126.

176. The lending capital of the banks is derived from three main sources—share capital subscribed by members, Government loans (the balance due to Government being $29,791.24) and Barclays Bank loans, (the balance due to this bank being $5,780).

177. Loans are made by the Credit Banks to members only and these are chiefly small agriculturists, with valid security, raising crops of padi, sugar-cane, ground provisions, etc. Some business is also done with persons engaged in coconut oil manufacture, pigkeeping, cowkeeping, huckstering, diamond seeking, etc. Money is also lent for repair of buildings and for purchase of properties.

178. In the following table a comparison of the business done in 1931 and 1932 by all the banks in the Colony is made ;—

Year.	Number of Loans made.	Amount Lent.	Loans Recovered.	Interest Collected.
1931 ...	814	$20,738 37	$ 25,588 07	$ 8,963 36
1932 ...	1,290	40,345 17	37,514 03	9,956 72
Increase ...	476	$ 19,606 80	$ 11,925 96	$ 993 36

179. Under the rules for Credit Banks, provision is made for the building up of reserve funds out of profits on the basis of 4 per cent. per annum on the paid-up capital of a bank at the end of its financial year. The total amount of investments carried out by the banks in this connection at December 31, was $29,834.38 and, in addition, $1,831.06 has been further allocated by the various banks for 1932 and will accordingly be invested later. There is also a Secretaries' Guarantee Fund in connection with the banks which stood at $3,031.24 at the end of the year.

180. The position of the Wakenaam, Leguan, Den Amstel–Fellowship, Beterverwagting–Triumph and Eldorado Block Co-operative Banks has not improved. These banks are in a bad way on account of various causes and will not be able to meet in full their indebtedness to Government.

Unemployment Relief Works.

181. During the year under review the southern section of the area occupied by the Lodge Village Allotment Scheme was conditioned from funds provided from Unemployment Relief Works. Fifty-six allotments, one-quarter of an acre each, were allocated to unemployed members of the Labour Union. As an incentive, agricultural implements, purchased from Government funds, were issued on loan to the allotment holders, while considerable quantities of seeds and seedlings were distributed free of charge including :—Banana suckers 2,100, Plantain suckers 1,000,

Sweet Potato cuttings 2,000, Onion seedlings 8,000, Cassava cuttings 1,500, Tomato seedlings 1,500, Black Eye Peas 180 lbs., in addition to various legumes and cover crops. The state of the cultivations has not been as satisfactory as was expected and a great deal of the planting material was lost, but it is hoped that during 1933, with the experience gained, there will be increased interest, improvement in the regularity of attendance and greater efficiency in cultural operations.

182. The scheme for the development of uncultivated lands on the Anna Regina properties was concluded during the year. In all 511 beds have been levelled for padi cultivation, 316 acres underbushed for provision cultivation and 408 acres wired in for pasturage. The total expenditure amounted to $32,951.30.

British Guiana Workers' League Exhibition.

183. The British Guiana Workers' League staged their second exhibition—the first being held in 1930—at the Promenade Gardens from October 20–22. The Department erected a special booth and displayed exhibits bearing on the important phases of all the major agricultural industries. In addition to the principal crops, sugar, rice, coconuts, coffee, cacao and limes, a special feature was made of legumes (green manuring and edible), fodder crops, varieties of sweet potatoes, budding, grafting and apiculture. Exhibits were also staged by the Entomologist, Botanist and Mycologist, Chemist-Ecologist, Plant Breeder and the Rice Grading Officer. During the exhibition, officers were on duty at the Department's stand and endeavoured to explain all matters likely to be instructive and of interest to visitors, while the agricultural officers acted as judges of the various agricultural products displayed. The display of vegetable products and preserves was good, but the entries in the purely agricultural classes, especially the exhibits in the "Fruit and Vegetable" section were below exhibition standard, both in quantity and quality. This is disappointing in view of the League's efforts in organising and running the exhibition.

184. A list of hints to exhibitors was published in the "*Agricultural Journal of British Guiana*," Vol. 1., No. 3, and it has been suggested to the League that these might also be included in their next prize list.

Field Competitions.

185. The following agricultural competitions were held in the various districts of the Colony during the year :—

Sugar.—

For the best established "Co-operative Block" of sugar-cane of not less than 10 acres of one commercial variety planted in the East Demerara District :—

(*a*) In Buxton District ;
(*b*) In Beterverwagting District;
(*c*) In Victoria District.

Rice.—

(1) For the best block of transplanted pure line seed padi on an area not less than half an acre on the East Coast, Demerara, between :
(*a*) Kitty and Mahaica;
(*b*) Mahaica and Abary.

(2) For the best block of transplanted pure line seed padi on an area not less than half an acre in the West Demerara District, between Vreed-en-Hoop and Hague.

(3) For the best block of transplanted pure line seed padi on an area not less than half an area in Berbice District :—
(*a*) On the West Coast at Bush Lot;
(*b*) On the Upper Corentyne District between Villages 70-72.

(4) For the best block of transplanted pure line seed padi on an area not less than half an acre in Essequibo District:

(*a*) On the Essequibo Coast;
(*b*) On Wakenaam Island.

Miscellaneous Crops.—

(1) For the best miscellaneous farm on the East Bank, Berbice, between New Amsterdam and Mara, the area to be not less than half an acre.

(2) For the best miscellaneous farm on the West Bank, Demerara, between La Grange and Stanleytown, the area to be not less than half an acre.

(3) For the best miscellaneous farm on the Essequibo Coast between Affiance to Richmond (including Anna Regina Estates) the area to be not less than half an acre.

(4) For the best miscellaneous farm holding of not less than one acre in extent in the North West District:

(*a*) In the Koriabo and Aruka Districts;
(*b*) In the Barima and Imbotero Districts.

School Gardens.

186. An effort was made during the year under review to establish demonstration vegetable gardens in three centres of the Colony but with discouraging results. This may be attributed to the fact that no club or school garden will ever be a success unless it is confined to an individual school, the work in the garden forming part of the daily curriculum of the school and the teacher held personally responsible for its success. Voluntary attendance only produces haphazard efforts. It is essential that a school garden should have daily attention, and arrangements must be made for the children to work daily in the garden, with someone to water it over week-ends and holidays.

187. Agricultural education amongst juveniles is a prime necessity, and with this object in view the establishment of school gardens at certain selected schools, under the ægis of the Department of Agriculture and the Education Department has received the consideration of Government. A definite scheme, which will come into operation in 1933, will form part of the school's curriculum and will be run in collaboration with the Education Department, the Agricultural Department will be responsible for the agricultural activities in the school and home gardens, and the Education Department for the discipline of the teachers and pupils. The selection of six schools for this work was in progress at the end of the year.

188. The establishment of an agricultural farm for the practical training of a number of boys of school leaving age is also under consideration.

LIVESTOCK.

189. Owing to the need for improved stock in the districts an effort was made to establish stud bull centres, under Government control, but with very little success, although cowkeepers near Georgetown made the fullest use of the farm bulls. The districts are in urgent need of improved bulls and the establishment of bull centres, under Government control, with a general improvement in the methods of handling animals and the conditions under which they live will materially assist in solving the difficulties associated with our livestock problems. The intensive system of stock management practised on the Stock Farm is advocated, but it is regrettable that farmers in the out-districts, handicapped by the low prices paid for milk, view all suggestions as to general improvement of stock and existing conditions generally, with apathy. Generally speaking, the extensive coast savannahs, handicapped by periodic flooding and arid conditions during periods of drought, are unsuitable for stock raising, calves being lost under both conditions. Undoubtedly, there are few areas on the coast where cattle can be profitably managed on *extensive* lines, and even in these favourable areas more satisfactory results would be obtained if

better drainage and irrigation facilities are provided. On the other hand, almost every part of the coast districts is suitable for *intensive* systems of stock management; various fodder plants and grasses can be easily grown.

190. The position as regards beef cattle remains unchanged but greater interest is being evinced in this direction recently. One company has imported Hereford Bulls for use on their ranch in the Rupununi. With careful management these bulls will be a great asset to the Company inasmuch as they were immunised against piroplasmosis and anaplasmosis before leaving England.

191. A gradual improvement is taking place in the pig industry to which the proposed establishment of a local meat factory should give an additional impetus. The Canadian Berkshire has proved suitable to local requirements and appears to be popular among pig breeders to whom young breeding stock, forty in number, have been supplied. It is not, however, proposed to increase the number of breeding stock until the market shows signs of improvement. The farm boars have been utilised for stud purposes.

192. The exceptionally heavy rainfall during the breeding season caused poultry operations to be suspended at the Stock Farm. A decrease in the quantity of stock birds is recorded owing to the old pens having had to be culled. Some delay in breeding operations has also taken place owing to two trios of birds, imported from England, not being up to specification. In addition, incubators and battery brooders have been imported; 766 eggs selected for hatching purposes were sold in 1932, 4,210 eggs for table purposes in addition to 30 chickens. During 1932 there were maintained at the Stock Farm :—Cattle—six bulls, four cows and six heifers of Holstein-Fresian breed, and two Guernsey bulls; Pigs—two boars and six sows of Canadian Berkshire breed; Poultry—two pens of White Leghorn and Rhode Island breeds; and one stallion donkey.

193. During the leave of absence of the Government Veterinary Surgeon, Mr. A. Fulton, Veterinary Surgeon, performed the duties of Government Veterinary Surgeon. The Department here records its appreciation and thanks for the services so rendered and is also indebted to Mr. John Fernandes for assistance in the poultry section of the Stock Farm.

194. *Tour of the Rupununi Ranches.*—The Government Veterinary Surgeon left headquarters on October 1, for a tour of the Rupununi Cattle Ranching District and returned on December 16, to investigate an outbreak of disease amongst cattle and to inspect the cattle trail with a view of deciding what improvements were most urgent. This second tour has served to corroborate the impressions made during the tour undertaken in 1931, a report on which was published as Sessional Paper No. 6/1931. The Government Veterinary Surgeon's findings may be summarised as follows :—The indiscriminate burning of the pasture grasses, practised on a large scale, does not lead to a shortage of grazing because the savannahs are practically empty but it spoils the land and destroys good grasses. In regard to grazing rights and leases it is thought that these should be reduced to a size which the rancher can manage personally, or to a size that can be efficiently handled with assistance. In other words, ranching management is advocated. A survey of the district is needed. Efforts have been made to establish Wynne Grass and Guatemala Grass but although the Department has shown every desire to co-operate by despatching these grasses to the steamers, free of charge, little progress has been made; the main drawback would appear to lie in the difficulty of conveying these parcels by river boat. Efforts are, however, continuing.

195. *Livestock Returns.*—The returns of livestock in the Colony for 1932 are shown in Table XIII.

Table XIII.

LIVESTOCK RETURNS.

County.	Horned Cattle.	Horses.	Mules.	Asses.	Buffaloes.	Sheep.	Goats.	Swine.
Berbice	61,085	577	468	4,050	...	23,026	9,419	8,436
Demerara	42,388	710	1,078	3,141	103	8,050	4,475	6,845
Essequibo	6,641	38	56	288	23	1,537	1,392	1,629
Hinterland Savannahs ...	76,061	3,037	14	7	...	186	69	589
Total	186,175	4,362	1,616	7,486	126	32,799	15,355	17,499

BOTANIC GARDENS AND NURSERIES.

196. The weather during the year was rather unfavourable, a very prolonged wet season being followed immediately by three months of almost continual dry weather.

197. Expenditure on the Gardens had to be further cutailed, two of the votes concerned being reduced and one abolished entirely. The latter covered the cutting of grass for police horses, which was subsequently carried out by prison labour.

198. A good deal of planting of both trees and shurbs was carried out during the year, especially in the central avenue, where several trees have died recently. The plants set out included a number of new introductions.

199. Several of the paths in the Flower Garden were resurfaced with burnt earth, an attention which was badly needed. The rose section of the nursery was considerably improved by the substitution of large concrete pots for the wooden tubs in which the better varieties had originally been grown.

200. The production of budded citrus was continued. After the large output of the previous year, the number of plants sold and distributed this year were considerably reduced by comparison. The available space is limited, and the better part of a year was needed to raise the fresh stocks of plants for sale. A large number of grapefruit, however, were basketed at the end of the year, for disposal early in 1933. Further reference to this work will be found in para. 95.

201. The use of bamboo under-drainage in the citrus nursery beds was found to give a very marked improvement in the root system of the plants.

SEED AND PLANT DISTRIBUTION.

202. The following is a comparative list of the planting material distributed locally by the Department during the period 1928–1932 :—

	1928.	1929.	1930.	1931.	1932.
FIELD AND GARDEN CROPS.					
Sugar-Cane	2,450 cuttings	138,000 cuttings	291,648 cuttings	400,000 cuttings	425,000 cuttings
Seed Padi	68,250 lbs.	75,242 lbs.	121,510 lbs.	129,290 lbs.	253,340 lbs.
Ground Nuts ...	392 ,,	14 ,,	...	...	...
Legumes (Cover Crops) ...	102 ,,	325 ,,	95 lbs.	551 lbs.	337 lbs.
Peas and Beans (Edible) ...	...	69 ,,	120 ,,	868 ,,	643 ,,
Soya Beans	216 lbs.	181 ,,	87 ,,	...	...
Onion (Seed)	36 ,,	28 ,,	35 ,,	47 lbs.	94 lbs.
,, (Seedlings) ...	...	...	10,650 seedlings	54,000 seedlings	10,200 seedlings
Tomato (Seed) ...	10½ ozs.	3 lbs.	...	...	3½ lbs.
,, (Seedlings) ...	...	...	900 seedlings	900 seedlings	4,130 seedlings
Plantains	...	...	...	762 suckers	1,060 suckers
Bananas	...	426 suckers	448 suckers	1,447 ,,	2,244 ,,
Fodders (Various) ...	...	3,000 cuttings	14,740 cuttings	15,000 cuttings	14,000 cuttings
Sweet Potatoes ...	...	...	950 ,,	42,000 ,,	8,400 ,,
Papaw (Seed)	...	...	1½ lbs.	½ lb.	2 lbs.
,, (Seedlings) ...	...	461 seedlings	118 seedlings	385 seedlings	174 seedlings
Broom Corn	...	49 lbs.	20 lbs.	5 lbs.	...
Sorghums	...	15 ,,	35 ,,	small quantities	small quantities
Cassava	...	...	...	...	8,400 cuttings
Pineapples	...	...	...	...	63 suckers
Tobacco	1 lb.	1 lb.	2 lbs.	4 lbs.	1 lb.
Cabbage	12½ ozs.	2½ lbs.	...	...	25 plants
Jute	...	...	...	3 lbs.	...
Jerusalem Artichoke ...	...	...	...	191 ,,	19 lbs.
Indian Kale	...	...	...	...	230 suckers

	1928.	1929.	1930.	1931.	1932.
ORCHARD CROPS.					
Citrus (Budded) Orange and Grapefruit.	100 plants	402 plants	634 plants	2,459 plants	1,207 plants.*
Limes (Budded) ...	...	...	100 ,,	2,086 ,,	1,195 ,,
,, (Seedling) ...	...	...	...	9,760 ,,	6,221 ,,
Coffee (Liberian) ...	3,187 plants	6,786 plants	1,429 plants	345 ,,	138 ,, (Arabian).
Nutmeg (Seedlings) ...	130 ,,	...	92 ,,	...	35 plants.
Miscellaneous Fruit (Seedlings)	938 ,,	743 plants	403 ,,	577 plants	1,187 ,,
Sapodilla (Seedlings) ...	...	283 ,,	149 ,,	186 ,,	...
Grafted Mangoes ...	...	...	97 ,,	166 ,,	79 plants.
Avocado Pear (Budded) (Seedlings).	...	...	...	186 ,,	74 ,,

* A large number budded at the end of 1932 will be available for distribution in 1933—*vide* para. 95.

SEED AND PLANT EXCHANGE.

203. During the year a number of introductions of both economic and ornamental plant material were made and reciprocated. Once again we were much indebted for the assistance given by the Department of Agriculture, Trinidad, in the matter of citrus budwood, several consignments being obtained from them. Early in the year, Mr. Allison V. Armour's Biological Expedition visited us when touring the West Indies and South America, and exchanged a number of plants and seeds with the Department. Amongst other material received during the year of which special mention may be made were :—A selection of palm seeds from different parts of the West Indies sent us by Captain H. A. G. Johnstone; about a dozen ornamental plants from the Trinidad Botanic Gardens, which were not represented in our own collection; several samples of seed of ornamental plants, received from Prof. John Balme, Mexico City; some Cinnamon seed from Ceylon, which unfortunately failed to germinate, and Cinnamon root cuttings from the Gold Coast which also failed; some mesquite seed from Honolulu, and Carob seed from Cyprus, neither of which, however, fared very well under local conditions. In addition, 50 budded limes of a smooth skinned variety were obtained from St. Lucia, over 400 "Queen" Pineapple suckers from Kuala Lumpur, and four varieties of Tangelo from Trinidad.

204. The Department has sent varied collections of seed to Toronto University, Honolulu, South Africa, the Seychelles, Florida and Trinidad.

205. The following table indicates the introductions by the Department during 1932 of economic and ornamental plants and propagating material. It is usual to record these in the Agricultural Journal but as this was suspended in 1932, their inclusion herein is desirable for reference :—

Description.	Quantity.	Whence Received.
ECONOMIC PLANTS.		
Marsh Grapefruit	2,900 buds	St. Augustine Nursery, Department of Agriculture, Trinidad
Marsh Grapefruit	675 ,,	Mr. W. S. E. Barnardo, Trinidad.
Duncan Grapefruit	500 ,,	St. Augustine Nursery, Department of Agriculture, Trinidad.
Oranges—Jaffa, Parson Brown and Valencia..	1,275 ,,	Do.
Tangelos—"New." "Sunrise." "Williams," "Sampson."	3 plants each	St. Clair Experiment Station, Department of Agriculture, Trinidad.
Budded Limes (Smooth Skinned) ...	50 plants	Agricultural Department, St. Lucia.
Chinese Yams	1 box tubers	Imperial College of Tropical Agriculture, Trinidad.
Do.	5 lbs.	Agricultural Department, St. Lucia.
Ipomoea batatas—Sweet Potato ...	14 ozs.	Bureau of Plant Introduction, Leningrad, Russia.
Colocasia Antiquorum ("Topee Tambo") ..	30 bulbs	Imperial College of Tropical Agriculture, Trinidad.
Turmeric	2 lbs.	Department of Agriculture, Ceylon.
Hill Padi	1 packet	Do.
Rexoro Rice	2 lbs. seed	Bureau of Plant Industry, U.S. Department of Agriculture, Washington.
Sweet Corn	1 packet	Porto Rico Agricultural Experiment Station, Mayaguez, Porto Rico.
Cajanus indicus—Pigeon Pea ...	4 lbs.	Imperial College of Tropical Agriculture, Trinidad.
Crotalaria juncea—Sunn Hemp ..	5 lbs. seed	Do.
Crotalaria spectabilis	1 packet	Florida Experiment Station, U.S. Department of Agriculture, Washington.
Phaseolus lunatus—3 varieties ...	3 lbs	Agricultural Department, Ibadan, Nigeria.
Lima Beans—3 varieties	3 lbs.	Do.
Beans—9 varieties	small quantities	Department of Agriculture, Entebbe, Uganda.
Peas—1 variety	do.	Do.

Description.	Quantity.	Whence Received.
ECONOMIC PLANTS—(Contd.)		
Ceratonia siliqua—Carob ...	1 packet	Department of Agriculture, Cyprus.
Prosopis juliflora—Mesquite—2 varieties	2 packets	Hawaiian Sugar Experiment Station, Honolulu.
White Sunflower Seed ...	4 lbs.	Department of Agriculture, Barbados.
Vegetable Seed—assorted ...	...	Messrs. Peter Henderson & Co., U.S.A.
Vegetable Seed—assorted ...	...	Messrs. Sutton & Sons, Reading, England.
Tomatoes—2 varieties ...	½ lb. each	Messrs. Wm. Ewing Co., Ltd., Montreal, Canada.
Papaw Seed—dwarf variety	small quantity	Canal Zone Experiment Farm, Summit, Canal Zone.
Anacardium occidentale—Cashew Nut	20¾ lbs.	Department of Agriculture, Trinidad.
Chilli Seed—variety "Shatta"	120 grammes	Department of Agriculture and Forests, Jerusalem, Palestine.
Guntur Chilli Seed—2 varieties	4 ozs. each	Agricultural Department, Madras.
Chilli Seed...4 varieties ...	½ lb. each	Agricultural Department, Coimbatore.
Chilli Seed—4 varieties ...	¼ lb. each	Agricultural Department, Madras.
Cinnamomum camphora—Cinnamon	10 root cuttings	Department of Agriculture, Aburi, Gold Coast.
Cymbopogon Nardus—Citronella Grass	½ lb. seed	Department of Agriculture, Ceylon.
Elæis guineensis—West African Oil Palm	2,000 nuts	Anglo-Dutch Plantations, Soerbang, Java.
Tobacco—3 varieties ...	1 packet each	Central Experimental Farm, Ottawa.
Tobacco—1 variety ...	1 packet	Division of Tobacco and Plant Nutrition, Bureau of Plant Industry, Washington.
ORNAMENTAL PLANTS.		
Cassia nodosa ...	1 packet	St. Clair Experiment Station, Department of Agriculture, Trinidad.
Camoensia maxima ...	1 plant	Do.
Calliandra Guildingii ...	1 packet	Do.
Colvillea racemosa ...	1 ,,	Do.
Coleospadix oninonsis ...	1 ,,	Do.
Deckenia nobilis ...	1 ,,	Do.
Oreodoxa borinquena ...	1 ,,	Do.
Phytelephas macrocarpa ...	1 ,,	Do.
Rheedia macrophylla—Hatstand Tree	1 ,,	Do.
Lucuma mammosa—West Indian Sapote	1 ,,	Do.
Macadamia ternifolia—Queensland Nut	1 ,,	Do.
Monodora grandiflora ...	1 plant	Do.
Posoqueria trinitatis ...	1 packet	Do.
Bougainvillaea—"Lady Watts"	2 plants	Do.

PUBLICATIONS AND LIBRARY.

206. As noted in the 1931 report it is much to be regretted that owing to lack of funds, publication of "*The Agricultural Journal of British Guiana*" has had to be temporarily suspended.

207. A number of pamphlets have been published during the year, including one on "The Organising of a Local Honey Industry," another on "Peas and Beans," and one containing a resumé of the proceedings and reproductions of the papers read at the second Annual Meeting of the Buxton-Friendship Farmers' Union.

208. "Agricultural Notes" compiled by the Department of Agriculture have been published in the local press, which has always been ready and willing to co-operate; only those subjects which it was thought would prove beneficial to local farmers being reproduced in this manner. The more important contributions have been:—"Tomatoes," "Sweet Potatoes," "Cashew Nut" and a series of "Live-stock Notes," "Beekeeping Notes" and "Horticultural Notes." A review of the work done by Professor Cheesman on "Banana Breeding" at the Imperial College of Tropical Agriculture and one of a paper by Dr. S. G. Barker on "Coir or Coconut Fibre—Its Extraction and Properties" have also been published.

209. The Department's library received attention during the year, and a clerk was appointed as Librarian to deal with the indexing and cataloguing of the contents of the library, and to superintend the distribution and circulation of scientific periodicals, reports of other Colonial Departments, etc., amongst the officers of the Department. The library is in receipt of an ample supply of periodic and intermittent literature from all parts of the world, this including research bulletins, administration and miscellaneous reports, which cover the whole field of agriculture and its related sciences. The publications of this Department are given in exchange as far as issues will allow.

210. A good start has been made in the arrangement and listing of the large number of miscellaneous pamphlets and papers in the library while a number of the more important reports, journals and periodicals which are regularly received have been bound. Some new books were added to the library during the year. While fair progress has been made in bringing the library up-to-date, the work has been handicapped owing to shortage of funds and of clerical staff preventing that continuous attention which is necessary.

AGRICULTURAL LEGISLATION.

211. On December 1, 1932, there was enacted the Rice (Export Grading) Ordinance, No. 40 of 1932, as an amendment to the Rice (Export Grading) Ordinance, No. 18 of 1930, which is the Principal Ordinance. It provides for the blending before grading of rice for export. On December 1, 1932, there came into force the Rice (Export Blending and Grading) Regulations, 1932. The above ordinances are fully discussed in paras. 67–70 under "Grading."

212. On December 17, 1932, there came into force the Rice (Export Trade) Ordinance, No. 47 of 1932, providing for the establishment of a Board with powers to regulate and control the price and exportation of rice produced in the Colony. Section 3 of this ordinance provides for the establishment of a Marketing Board with a definite personnel, and constituted as a body corporate. Should an exporter attempt to undercut the export price fixed by the Board, or export rice without a licence or contract, he will be liable, under Section 16, to penalties involving a fine of not more than $100 for the first offence and $300 or imprisonment for three months for subsequent offences. The important features of the ordinance are set out in sections 12, 13 and 14. The duration of the ordinance has been limited to June 30, 1933, and a report of the activities of the Board will be submitted to Government in May, 1933, when the effect of the measure can be judged and the question of future action decided. Further reference to the establishment of this Board is made in para. 33.

213. On August 30, 1932, there came into force Ordinance No. 38 of 1932, to amend the Animals (Breed and Contagious Diseases) Ordinance, conferring powers on the Governor in Council in case of emergency.

214. On September 1, 1932, there was enacted the Sugar Experiment Stations Ordinance, No. 41 of 1932, to provide for the control of Sugar Experiment Stations.

VISIT OF COLONIAL AGRICULTURAL ADVISER.

215. Mr. F. A. Stockdale, C.M.G., C.B.E., Agricultural Adviser to the Secretary of State for the Colonies, visited British Guiana early in the year, arriving at the end of February and spending about a fortnight in the Colony. His visit formed a part of a tour of the British possessions in the Caribbean, and his report was published in due course as C.A.C. Bulletin 128.

216. During his stay in the Colony, Mr. Stockdale visited the greater part of the cultivated areas of the coastlands, and was also able to make a journey up the Demerara River to see the new pineapple venture at Amsterdam being carried out by the B.G. Fruit and Canning Company. His former experience in the Colony as a member of the original Department of Science and Agriculture enabled him the more readily to sum up the conditions of agriculture here at the present time.

217. Mr. Stockdale was particularly impressed with the research at present in progress for the furtherance of the sugar industry, and was especially interested in the soil survey work being carried out under the supervision of the Chemist-Ecologist as well as the Bush Lot Land Settlement Scheme, Essequibo. He was also much struck by the development of the rice industry as a second string to sugar during the past few years.

218. In addition to sugar and rice, his report deals also with the minor crops of the Colony, and a number of questions bearing upon agriculture which were discussed at the time of his visit.

GENERAL REMARKS.

219. Agriculture is a business and the factors which affect business in general, largely affect agriculture. The one factor dominating all others is the general price level. When prices are falling there is a depression, when prices are rising there is prosperity. During 1932 prices continued to be low; during 1932 there continued to be a depression. Again, as statistics indicate, there are great disparities between the price relationship of agricultural and non-agricultural commodities, that is, the purchasing power of agricultural products is much lower in terms of other products; hence the depression is more acutely felt in the case of those occupied in agriculture than might generally be realised. The lack of appreciation of these simple relationships is, no doubt, responsible for the fallacious views sometimes ventilated in regard to agricultural policies.

220. For many years the mainstay of the Colony has been sugar and there is little indication that the position is changing. There is an explanation for this. In these times of strenuous agricultural competition, a country can only compete effectively in world markets with a crop to which local conditions adapt themselves readily and whose production costs can be reduced as low or lower than those of competitors. Other instances of this are the rice of the East, the cacao of West Africa and the coffee of Brazil.

221. In this Colony, therefore, it is of primary importance to obtain "better value for money" in the sugar industry—for yields to increase while expenditure remains the same or is reduced. With this end in view, the Department of Agriculture is making a thorough investigation of soil conditions as well as carrying out an extensive series of experiments, both on methods of cane cultivation and manurial treatment, and on the varieties of cane cultivated. These investigations have already yielded valuable data and are being put to practical use by the sugar estates, and they are continuing to provide information by means of which agricultural practices may be built up or modified. A striking feature of this endeavour is the co-operation which has been achieved between the Department of Agriculture, the Sugar Experiment Station and the sugar estates. Long may this evidence of keenness and goodwill continue! The work done has attracted much favourable comment from those qualified to judge and has been such as to justify financial assistance from the Empire Marketing Board as well as from Messrs. Imperial Chemical Industries, Ltd., the latter jointly with Messrs. Booker Bros., McConnell & Co., Ltd., financing certain manurial experiments under the direction of the Department.

222. Rice, the Colony's second most important crop, has had to compete with more cheaply produced Indian rice and because of the local unorganised marketing system, the Colony's product has frequently competed with itself on export markets. It is to be hoped that with the revision of the Grading Ordinance, with the organisation of a Central Marketing Board and the formation of District Rice Associations, more stabilized marketing conditions will be secured, resulting in greater benefit to the industry—one which, with sugar, is so eminently adapted to the coastal lands of the Colony. Rice, unquestionably, provides an excellent subsidiary to sugar under local conditions. During the depression the value of the rice industry has become more and more apparent. Labour not being fully employed on sugar estates has found additional avenues of employment in rice and, in this connection, an increasing number of West Indians are showing some attention to this crop—which is both a food and a money crop. Exports continue to increase and during the year, in spite of low prices, were valued at $1,187,871. If to this sum is added the value of the commodity consumed in the Colony, of the labour employed and of industrial activities generally associated with the industry, the total value to the Colony is not short of two million dollars—a substantial sum for a subsidiary industry.

223. In other directions, some enterprising individuals have shown that a local market for truck crops and fruit can be found. It is hoped that this example will be followed. There has been a considerable increase in the distribution of seeds and planting material by the Department as the records under this head show.

224. Efforts to encourage farming among villagers have been made by the Department along several new lines, especially in regard to the establishment of cane-farming on the co-operative block system. In this connection, a successful Farmers' Day was held at Buxton; members of the Department attended, read short papers on various aspects of agriculture and discussed generally with farmers their various problems.

225. In the encouragement of beekeeping another attempt has been made to provide an additional source of income for the small farmers. The Department has established a model apiary in the Botanic Gardens where cottagers and others interested in apiculture may receive advice and instruction. At this apiary Italian queens are bred and distributed at a nominal cost to beekeepers. The Beekeepers' Association is closely co-operating with the Department.

226. The erection of a canning plant by the Pineapple Company on the Demerara River also points to further possibilities of turning some of the minor local products to profit.

227. The Department has continued its efforts to increase interest in livestock, particularly in cattle raising for beef production and to place this industry on an export basis. The activities with poultry and pig raising also deserve mention.

228. Assistance has been afforded the unemployment problem, especially in Georgetown, and encouragement and supervision given in the establishment of garden allotments at the Lodge Village for the production of food crops. These and other efforts are fully described in the report.

229. Administration duties continue to be heavy, and it is difficult to cope with the increasing volume of work, the nature of which invariably requires careful study and prompt attention. This applies not only to matters affecting departmental policy, preparation of memoranda and reports on various schemes for development, but also in regard to general correspondence, committee meetings, interviews, Executive and Legislative Council work. During the year several officers were on leave, including the Deputy Director of Agriculture, and this helped further to accentuate the position, as there is no extra staff to fill any gaps due to sickness, leave or other enforced absences.

230. The need for improved headquarters accommodation continues to be acutely felt, and the work of the Department is being handicapped thereby. Few appreciate the great difficulties being experienced in this connection. There is grave danger now of papers, books and records being ruined owing to insecurity of roof, windows, etc. The Public Works Department has continued to patch but such efforts are rendered nugatory by the general decrepit state of this very old and unsuitable building.

231. The services and advice of the Director and staff were fully utilised by local and overseas, commercial and scientific visitors during 1932. Special mention should be made of the visit of Mr. F. A. Stockdale, Agricultural Adviser to the Secretary of State for the Colonies, from February 28 to March 15 and of his findings on the work and organisation of this Department.

232. In conclusion, I should like to express my great appreciation of the loyal help rendered by the staff during the year. The thanks of the Department are due also to the agricultural and mercantile community for assistance generously rendered, and to the local newspapers for their courtesy in distributing agricultural information.

J. SYDNEY DASH,
Director of Agriculture.

July 14, 1933.